The Builder.

VOL. XXXVI. No. 1845. SATURDAY, JULY 6, 1878.

ILLUSTRATIONS.

Street Architecture, Birmingham: The Atlas Electro-plating Works.—Mr. Yeoville Thomason, Architect 693
New Court, Lincoln's Inn.—Mr. Waterhouse, A.R.A., Architect 699

CONTENTS.

The Geometry and Optics of Ancient Architecture 685
Dodona Discovered 687
Chromatic and Delineatory Scale in Architectural Drawing 689
Sanitation at the Paris Exhibition 690
Fires in Theatres 691
Measures and Weights 693
The Staircase-Hand of the Old School: A Sketch 693
The Staircase at the Rock 694
The Dome of the Rock 695
The Land Surveyors' Club in Staffordshire 695
Obituary 695
School of Fine Arts, Paris 695
The Great Crosby Schools 696
The West Marina Esplanade, St. Leonard's-on-Sea 696
Social Science Congress 696
Atlas Electro-Plating Works, Paradise-street, Birmingham 696
New Court, Lincoln's Inn 696
Domestic Economy Congress, Manchester 701
Lincoln Diocesan Architectural Society 702
Waterworks 702
Æsthetic Tastes 703
Over-Production 703
Institution for the Education of the Daughters of Missionaries, Sevenoaks 704
Parliamentary 704
Archæologists at Winbech 704
Archæological Discoveries 704
Archæological Societies 704
The Certosa at Pavia, and the Basilica of Constantine at Rome 705
Rude Stone Monuments 705
"The Adornments of the Obelisk" 705
"An Act of Barbarism" 705
Organs 705
Docks and Harbours 705
Illuminating Gas from Water or Sewage 706
Prevention of Decay in Wood 706
Street Architecture in the Provinces 706
Baths and Wash-houses 706
Drainage Items 706
Compensation Case: Marston v. The Metropolitan Board of Works 707
Arbitrations 707
Hospitals and Infirmaries 707
Railways 707
Church Building News 707
Dissenting Church-Building News 708
Church of the Oratory, Brompton 708
The "Comet" Pump 708
Masters and Men 709
Books received: Hoskold's Engineer's Valuing Assistant (Longmans); Variorum 709
Miscellanea 710

The Geometry and Optics of Ancient Architecture.

IT is not from any indifference in regard to Mr. John Pennethorne's large and important book on the above-named subject,* that we have somewhat delayed noticing it in detail, but rather from a feeling that a book which deals with so intricate a subject, and which represents the summing up of so much consideration and study on the part of its author, demands proportionately careful consideration on our part before recording our opinion on the results.

From Mr. Pennethorne's preface it appears that as early as 1830-5, when he was travelling as an architectural student, he had been impressed with an idea of the extreme accuracy of execution of the Greek buildings, and of the refinements of design which might be expected to be discovered in them when fully studied; and also of the relation of Egyptian architecture to that of the Greeks, as its basis both in regard to colour and form. In 1837 he again visited Athens, and made such observations as the then state of the ruins and the instruments at his disposal permitted; and at this time, as Mr. Penrose mentioned at a meeting of the Institute the other day, he discovered the curvature of the horizontal lines of the Parthenon (which, he says, had also been about the same time noticed, independently of himself, by Herr Shaubert, a German architect residing at Athens), which he approximately obtained, and also measured the entasis of the columns, and moulded in wax all the smaller curves of the capitals, cornices, and mouldings, and traced the sections on paper. Failing health prevented his doing more, and study of the subject convinced him that further and more accurate data were required for completing it. In 1860, during a period of enforced retirement owing to illness, the author looked over Mr. Penrose's work on the Parthenon and M. Beule's "L'Acropole d'Athènes," and found that most of the information he had wanted had been collected between the years 1846 and 1854. He then resumed the subject; was able to correct some errors in his theory as to the horizontal lines by the light of the superior accuracy and minuteness of Mr. Penrose's measurements, and worked out his views into the form in which they are stated in this splendid but almost too ponderous folio volume, the real object of which may be best described in the author's own words:—

"The observations which have been made on the remains in the Acropolis of Athens lead to the conclusion that these works were originally laid down and calculated with mathematical accuracy, and this being the case, we can inductively recover the laws by which they were designed, and demonstrate them by re-calculating the same works, step by step, in the same manner as have been demonstrated the laws in astronomy, and in all the other exact sciences: and it is some of the mathematical principles of the Greek architects and artists that I have endeavoured, however imperfectly, to recover and lay down in the following work.

These principles were evidently the result of many centuries of careful thought and study by the leading scientific minds of the ancient world; we can discover the germ of them in the best period of Egyptian architecture, at least B.C. 1300; we can trace them through all the works of the Greeks which remain to us, either in Asia Minor, in Magna Græcia, or in Greece proper; and we find their greatest development in the Greek works of the age of Pericles, B.C. 450, at which period all the mathematical and artistic talent of the world was collected in Athens as a centre, and the accumulated knowledge thus brought together was applied by the Greeks to the restoration of their temples in the Acropolis which had all been destroyed by the Persians.

If the remains of ancient art are worth measuring and publishing, I see no reason why they should not be restored and laid down as they were originally conceived or designed, or why the scientific thought and intellect that was once brought to bear upon them, and which still exists in their ruins, should not be recovered and preserved to us."

The author obviously feels the necessity of calling attention to the exceptional refinement of perception in regard to geometric principles in building which probably existed at the period of the highest development of Greek architecture; and Mr. Penrose makes a somewhat similar observation in Chapter xiv. of his work on "The Principles of Athenian Architecture," where he remarks that in all probability the want of each optical correction was felt, and the correction made, separately, and as the result of a series of experiences; and that this will appear the more likely, when we consider the very long period during which the Greeks were working out the perfection of the Theseum and the Parthenon; "so that an amount of intellect, unparalleled in the history of art, was concentrated on a comparatively limited field, and time was given carefully to examine and obviate all the causes which tended in practice to distort the lines of architecture." It is necessary to bear such a consideration in mind, in order to conceive the possibility of the application to architectural design of refinements which in the light of modern practice would seem so superfluously minute; indeed, when Mr. Penrose not long since revived the subject at a meeting of the Institute of Architects, it was obvious that the younger generation of students, to whom the conclusions were new, were to a great extent sceptical. Whether it is possible to go too far and attribute too much to the intentions of the Greek architects is another question, which Mr. Pennethorne's work, to say the truth, is rather calculated to raise.

So far as Mr. Pennethorne's book is concerned with those refinements of curved lines in the steps, entablatures, pediments, and entasis of the columns, which have been so fully demonstrated by Mr. Penrose, and which are now accepted as recognised facts, it is unnecessary to say anything in detail about a subject which is now an old one. The only special interest which could attach to the demonstration of this part of the subject in a new work, would be in regard to the reasons for the special adjustments in question, if any new light were thrown upon them. Ever since the discovery of these curvilinear adjustments of line in the Parthenon and other Greek buildings, it has been a vexed question whether these were applied in accordance with a complete and logical theory of correction of optical illusion, or whether (in part, at least) their origin was artistic rather than scientific, and was the result of the experience of the eye in regard to the hard and rigid appearance of straight lines. In the former case they would obviously not be intended to be visible to the eye; in the latter they might be, though only to eyes trained to look for them. For example, the leaning inward of the columns was almost obviously intended to be seen, and was partly the result, we imagine, of a reminiscence of the sloping lines of Egyptian architecture, with which the Doric has such obvious hereditary connexion. Yet Mr. Penrose says of this characteristic:—"The parts are made to harmonise with one another with so much art that, on my first visit to Athens, though immediately sensible of an unwonted perfection in the Theseum and Parthenon, it was only after a considerable time and careful study I could assure myself that the unaided eye could judge which way the columns leaned;" but it is obvious that he could so judge, after his eye became accustomed to their refinements. His opinion, on the other hand, of the entasis, is that it was intended to be only just sufficient to counteract the tendency of a straight-lined cone or column to appear hollow; a tendency which every one has noticed, but as to the reason of which no two authorities are agreed. An attempt was made to formulate a scientific optical theory for it, with doubtful success, by Mr. Garbett, in his remarkable little book on the "Principles of Design"; Mr. Penrose suggested two or three reasons for the hollow effect of the straight-lined column, and the necessity for the entasis, without decidedly pinning his faith to any one of them; and Mr. Pennethorne comes to practically pretty much the same conclusion, or absence of conclusion, in his remark that "I am not aware, even with our present knowledge of optics, of any law by which we could accurately correct the optical deceptions that are to be observed in a building like the Parthenon," adding, in regard to the entasis of the column, "the outline is, I believe, a true mathematical curve, traced so as to be agreeable to the eye." That it is a true hyperbolic curve the evidence of Mr. Penrose leaves beyond all question; but the love of the Greeks for refined curves is sufficient to account for this, without supposing that this particular curve was selected as affording a true scientific correction of every specific and calculated optical distortion. In short, we believe the columnar entasis is artistic, not scientific, except in so far as the science of tracing a true hyperbola is concerned.

But it is otherwise with regard to the curves of the step and architrave and pediment lines in the end elevations. These, there can hardly be a shadow of doubt, arose from the observed

* "The Geometry and Optics of Ancient Architecture, Illustrated by Examples from Thebes, Athens, and Rome." By John Pennethorne, Esq., assisted in the drawing and colouring of the plans, and in the arrangement of the text, by John Robinson, Architect. Williams & Norgate, London and Edinburgh. 1878.

effect of the raking lines of the pediment in depressing the horizontal line of the cornice and architrave at its centre, and the curve was intended to be such as to correct this illusion. The angle at the apex of the pediment dominates the whole front, and is master of the situation in this respect. To make the straight cornice under it appear straight, it must be slightly raised in the centre, and the architrave of course also; and then the lines of the steps which form the base must necessarily follow, otherwise they would look hollow, and the centre columns too long, beneath the raised centre of the architrave. Then, as the architrave and cornice have assumed an upward curve, the raking line of the pediment must be slightly convex also, otherwise it would in its turn appear hollow in contrast with the convex line of the horizontal cornice. But the pediment angle in this way actually (though indirectly) affects the line of the steps on the return sides of the building also. For we have no doubt this is the real explanation of the curvature in the line of the steps on the flanks of the Parthenon. As Mr. Penrose has pointed out, the fact of the curvature being found in the *fronts* only of the temple of Neptune at Pæstum (which is an early example), and not on the flanks, is conclusive as to the curvature being originated by the pediment; and it was no doubt subsequently introduced on the flanks also, though in a lesser degree, in order to avoid the appearance of incoherence between the curved lines of the fronts and the straight lines at the flanks. In regard to the flank curvatures and the method of calculating them in relation to those of the front, Mr. Pennethorne's theory, stated and illustrated on pages 98 and 99, is not quite consistent with the measurements of these curves given by Mr. Penrose (plates 10, 11, 12), and would make the crown of the flank curves too high; whereas, on the south flank, at all events, the apex of the curve is hardly any greater in its rise than that of the fronts, in spite of the much greater length of the flank; so that it is evident the curve was not intended to be so much emphasised on the flanks. In another point, in regard to the deviations from the perpendicular in the columns of the portico, Mr. Pennethorne's theory seems quite unsupported by facts. He regards the portico-columns (all but the angle ones, which lean inwards considerably both ways) as being set at right angles to the curve of the steps, so that the three on the north side of the centre lean northwards towards the outer angle, and the opposite three southwards, towards the other angle, radiating like the sticks of a fan, and he refers to Mr. Penrose's measurements as rendering this evident. But if we turn to the minute measurements and notes of the east front (Penrose, plates 7 and 8), we find that the deviations of these columns from the perpendicular are almost infinitesimal, averaging ·006 in. (except in one case, which is noted as the effect of a shift), and that two of these minute divergencies are in the wrong direction for our author's theory; and as he, with ourselves, admits the minute accuracy of Mr. Penrose's measurements, it is obvious that there has been a little cookery of the facts to fit the theory. Our impression from Mr. Penrose's measurements is that all the portico-columns, except the angle ones, were intended to be vertical, so far as the front elevation was concerned, though they incline inwards towards the *cella*; but that the capitals and *abaci* were at right angles to the curve of the architrave, and therefore had an axis deviating more or less from that of the columns beneath them, the joint immediately beneath the necking being slightly skew to the axis of the column.

This is clearly shown in the purposely exaggerated sketch given by Mr. Penrose on page 13 of his book; and we imagine Mr. Pennethorne has looked only at the measurements of the *abaci* in Mr. Penrose's plates just mentioned, and overlooked the figures at the foot of each plate which give the deviation of the shafts of the columns from the perpendicular.

So far we have been dealing with deviations and refinements with the idea of which we are already familiar. What is the special aim of Mr. Pennethorne's book, and what is unfamiliar to most readers,* is the proposition that the Greek buildings were designed so as to present, when seen in perspective from a certain point, a precise proportion of parts and dimensions in commensurate ratios, and that, in fact, the design, as intended by the architect, only existed as seen from that special point, and was worked out for that end with the greatest precision by means of trigonometrical calculations. The precise reasoning which first led the author to this conclusion we do not gather quite definitely from his pages; but his idea on the subject appears to have arisen first from the observation of certain apparently intended geometrical ratios in the plans and heights of Egyptian architectural remains, built or excavated, leading to a conviction that the Greeks, having in other points borrowed and improved upon the ideas of the Egyptians, would not have failed to seize this idea of geometrical proportion also and perfect it; and that the supposition of such a principle gives the best explanation of certain allusions to the problems of architectural design in Greek writers as well as in Vitruvius; as, for example, the remark quoted from Plato that "if artists in large works were to give the true proportions of beautiful things, the upper parts would appear smaller than is fitting, and the lower parts larger, through the former being seen by us at a distance and the latter close at hand,"—consequently, "artists, bidding farewell to truth, work out not real proportions, but such as will seem to be beautiful in their representations"; a passage which is, of course, suggestive of a very refined and exacting taste in regard to the adaptation of designs to the circumstances in which they were placed, such as no one will doubt that the Greeks did possess. Mr. Pennethorne's views on the subject may be further illustrated by the following remarks from the last section of his introductory chapter:—

"The laws of geometry were, by the Egyptians and Greeks, derived from a careful study of such natural forms as the sphere, the cylinder, the cone, and the prism, with the sections obtained by cutting through these solids at different angles; and the tendency which is found to exist in all these forms, either solid or plane, to exact proportions and true mathematical curves described by fixed laws, was very early discovered and applied to art, and the laws of ancient art will be found to be simply a practical application of these natural principles, thus:—

In Proportion, it was a principle that everything should combine in aliquot parts, and modern discoveries confirm this as a true law, which is illustrated by many facts in physical science.

It was also considered necessary that all curvilinear forms should be the arcs of true mathematical curves, such as the Circle, the Ellipse, the Hyperbola, and the Parabola, and there is a tendency in natural forms, when undisturbed, to fall into one or other of these several curves.

The outline being thus made mathematically perfect, variety of colour was also considered as an essential part of every design, to give clearness to the ornaments, as well as to harmonise the design with all the surrounding works of nature, in which the greatest varieties of positive colours are found to exist.

Besides these general principles, it was requisite, when designing any large work, to convey the idea of the perfect design, as it existed in the mind of the artist, to the spectator through the medium of the eye; and to prevent any apparent disturbance, either in the proportions or lines, it was found necessary to introduce certain corrections in the vertical as well as the horizontal lines of the first masses; the position, therefore, of the spectator had to be determined, and confined by artificial means within the limits of certain visual angles, favourable for the contemplation of the general design."

Such is the outline of the system which Mr. Pennethorne supposes to have been at the basis of Greek architectural design, the existence of which he proceeds to illustrate at length by a process of reasoning and investigation for the most part perfectly rational and logical in its conduct, however we may think it open to question in regard to some of its premisses and results. The nature of the problem practically, as conceived by Mr. Pennethorne, may be roughly illustrated by the accompanying diagram. If the spaces marked A, B, C, &c., in the left-hand column, are taken to represent so many equal vertical stages of a design to be seen by a spectator standing at O, it is obvious that some will be more distant from the eye than others, and will consequently subtend smaller visual angles than others, and appear smaller in the field of vision. Instead, therefore, of dividing out the wall itself into equal heights, let us project the whole height on the arc X Y, and divide it into equal parts subtending equal visual angles, and then, producing the lines from the point of sight through each point on the arc X Y, till they cut the perpendicular column, and dividing the latter accordingly, we get a series of vertical stages, which, though not really equal, will all occupy the same height in the field of vision. Figure 2 illustrates the application of this to the actual design of a building. Let *a b* represent roughly the profile of a Classic building in which it is desired that the superstructure shall bear a certain commensurate proportion to the height of the column or pilaster, when the whole is seen from a given distance, *c d*. If the intended proportions were carried out merely as designed in geometrical elevation, the cornice and architrave would appear too low; the intended proportions are accordingly, as before, projected on the arc X Y, struck from the eye as a centre (represented by the point O at the required distance from the arc of delineation), and the lines drawn through the points on the circle to cut the perpendicular give the proportionate heights in which the column and superstructure must really be designed, in order to appear of the commensurate proportions intended. It will readily be seen how the method is applicable to every portion of a design, so that all may be built so as to appear of any given definite proportion or ratio of dimensions when viewed in perspective from the proper point. No one of course pretends that there is anything new in the idea of designing parts of a building larger in elevation than they are intended to appear in perspective, in order to allow for the effect of distortion; though, from what we frequently see in executed buildings, it would seem that even this simple and necessary application of

FIG 1.

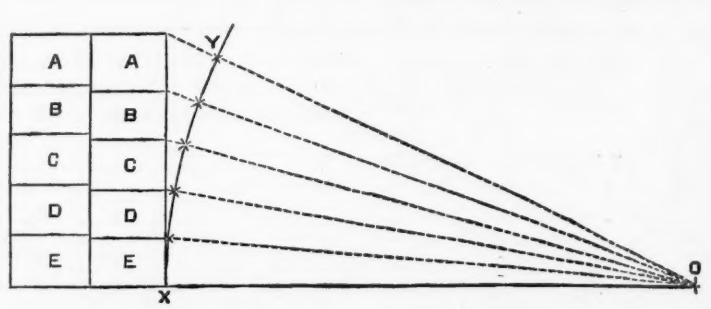
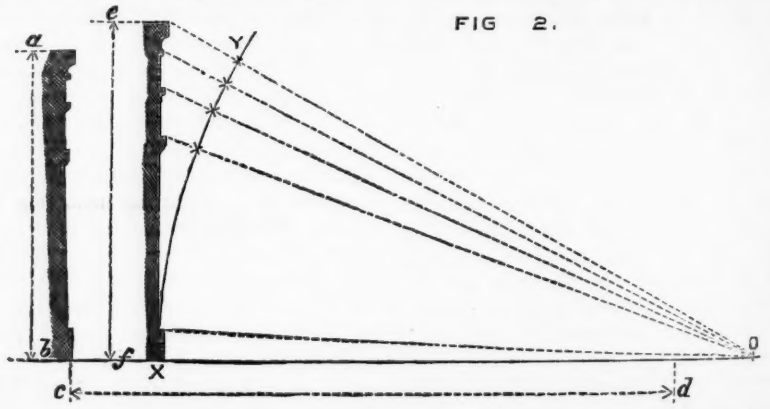


FIG 2.



* Mr. Penrose, in a footnote in his work, refers incidentally to a theory similar to that of Mr. Pennethorne, as having been started before that time, but without giving the name of its author; we presume he referred to the same reflections which are now published in *ex enso* in the work we are noticing.

optical correction is often neglected where it might advantageously have been attended to. The specialty of the method illustrated in Mr. Pennethorne's pages, and which he believes was that practised by the Greeks, is that not merely generally pleasing proportion, but an absolutely commensurate ratio of dimensions when viewed in perspective, is considered a *sine quâ non*, and that with this end the whole building is to be trigonometrically designed for effect from a given point of view, from which only the intentions of the designer can be realised. We will in another article briefly consider the line of argument and investigation upon which this conclusion is based, and the value of the idea, critically regarded, in reference to architectural art.

DODONA DISCOVERED.

AMONG the thousand and one objects and collections which attract,—which distract,—attention at the great Parisian Exhibition, it may be pardonable if even a very painstaking and conscientious explorer should overlook a comparatively moderate collection of antiquities contributed by M. Constantin Carapanos. And yet these objects, comparatively few, and even in themselves not conspicuously remarkable, are symbols of the solution of a problem which has long interested students of Greek history, and been the puzzle and the opprobrium of topographers and travellers. Up to the present time, it has been the commonplace observation of classical and geographical treatises and dictionaries that Dodona was the only site of great interest in Greek antiquities, which still remained unknown, and seemed to baffle the most persevering attempts at identification.

The oracles of Dodona, interpreted from the rustling leaves of an oak tree, were consulted by the Homeric Ulysses, and the hero of the other Homeric epic, Achilles, invoked with observance the most solemn the god, Pelasgic Dodonæan, who, in remote locality, was served by priests with feet unwashed, and who slept on the bare ground. The oracle of which the vogue descended thus from the very night of legend, had recognised authority in the best age of historic Greece; and even in Roman times, and after plunder and devastation of its sanctities, its cessation is only noticed equivocally,—"it had in a manner"; or, "it had as good as come to an end." To the rustle of oak-leaves was added the casual jingling of suspended pans as the wind might agitate them, and no simpler machinery could be imagined for leaving free the sagacity or ingenuity of the administrators of the sanctuary to deal to the best of their judgment with the questions,—sometimes momentous enough and sometimes ludicrously trifling,—that were addressed to them.

Sufficient notices remained in ancient geographers and historians to certify that this mysterious site was on the borders of Thesprotia and Molottis, and could not be far from Janina, the capital of that Ali Pasha whose tyranny and cruelty only seem exceptional in the dealings of the Turks because they fell more immediately in the way of being witnessed by the Frank. One effect, however, of the unsparing tyranny of Ali Pasha was, that he engrossed it as a privilege in his own hands, and thus at the beginning of the century his country was safe for travellers from the European states,—from France and England, with which it was his interest not to embroil himself. So it was that Colonel Leake, Byron and Hobhouse, Hughes and Cockerell, severally or in company, traversed the country and made observations upon topography, antiquities, and manners, that it is still very pleasant to peruse. For those who had the advantage of personal intercourse with the late Professor Cockerell, and preserve a lively impression of the charm which he diffused around him, it is very agreeable to come upon traces from time to time among these travels of the influence of this charm in his earlier days,—upon notices of "our enthusiastic young friend,"—upon regrets for losing his "ever-entertaining and instructive society."

Of these travellers, Leake, Pouqueville, and Hughes made it their especial business to give attention to discovering the site of Dodona; and now that the lost has been found, there is something even amusing in following the ingenious and elaborate trains of investigation and reasoning by which they confirmed themselves in favour of false sites, while as perfectly familiar with the true locality and with indications that might seem to force themselves upon their notice as betraying it infallibly. But even these examples are, perhaps, less pregnant with warning to investigators than that of a much later traveller who picks up and puts together with accurate sagacity every point of evidence that establishes a case irrefragably, and when he comes to a point where he might naturally be prepared to affirm the inevitable conclusion, takes fright, and from some inability, as it would seem, to make a precedent by exercise of private judgment, falls back upon hesitation, and leaves the question in the air,—adjourns the controversy, bleeding, to another hearing.

Pouqueville,—"Pouqueville is always out," says Lord Byron,—made up his mind, under influence of another theorist, that a site so antique must needs be distinguished by remains of considerable Cyclopean architecture,—and had neither eyes nor reason for any locality where the feature was wanting. He pitched upon a height with such an acropolis as he had decided was essential between the two lakes of Janina, and thither, among others, Lord Houghton,—then Mr. Monckton Milnes,—was conducted, to be assured that the matter was settled beyond question. Yet some were wiser, and it is unlucky for them that the French consul, in condemning their hallucinations, does not think it necessary to mention their names. "I shall pass over in silence," he says, "the dreams of those who believe that the Olichinian Mountains (Olytzika of Carapanos) are Mount Tomaros, and the ruins near Dremichaux those of Dodona, to come to the topography of the valley of Janina, where we shall find Hellopia, the hieron of Jupiter, the Pelasgic *enceinte* inhabited by the Selli, Mount Tomaros and Dodona."

These dreamers, whoever they were, are now fully vindicated as being gifted with that first,—which is better than any second,—sight, the insight of clear, good sense. The recent discoverer, M. Carapanos, is a member of a family at Arta, on the Ambracian Gulf, and, like so many other Greeks, took full advantage of those educational opportunities which Athens now abounds with, before entering on a successful career, which established him as a banker at Constantinople. The study of the ancient authorities first disposed him to regard the site of the Dremichaux of Pouqueville as the probable Dodona, and this was encouraged by scattered antiquities discovered by the peasantry. Among these was one class of leaden tablets, destined to be of the highest antiquarian interest, which the peasants unfortunately were only eager for to eke out ammunition. There was the usual difficulty in obtaining authorisation from Constantinople, which, in one way or another, however, was, as usual, obtained at last. Acting upon this, M. Carapanos employed labour unstintingly to clear the ground, and since this work was done, has put into form, and printed his results, with full illustrations, in a careful and thoroughly well-edited publication. It must be said that no very important works of fine art, or even of archaic art, were obtained by the spade. By a rather odd coincidence, a bronze figure of a satyr, with the feet of a horse, was found, and might seem to justify the conjecture of an ancient critic, that Homer described Dodonæans, not as with "unwashed feet" (*aniptopodes*), but "horsefooted" (*hippopodes*). But what is decisive is the evidence of the inscriptions: the most important of these were scratched upon thin lead, and proved in many instances to be the text of inquiries made of the Oracle.—inquiries of marvellous range,—from the difficulties of diplomatists as to the stipulations to be insisted on in a treaty, to the perplexity of a sufferer by petty larceny.

The site is sufficiently bleak to answer the epithet which Homer bestows upon it,—"severely wintry"; it is in a depression between lofty mountains of bare white limestone at the top, and belted with forests above a lower cultivatable slope. The valley itself is at the crest of a watershed, but only exempt from floods by the escape afforded by subterraneous channels.

Of the place itself the remarkable characteristic is the association of a most disproportionately large theatre, with a very small fortified enclosure. The theatre is quite one of the largest as well as best preserved in Greece. Hughes gives the diameter of the semicircle as 450 ft., and that of the orchestra 130 ft. The rows of seats are given as between fifty-four and sixty, and calculated to accommodate 18,000 persons, or even 20,000 on occasion (Leake). The back of the cavea, as usual, is based on the solid side of a low hill; the advanced sides rested on vaults which were accessible in 1807, and until ruined by an earthquake a few years after. The masonry of fine hewn stone,—*isodomon*. It faces south-east. Hughes gives the circuit of the citadel above the theatre as only 770 yards by pacing; the walls 11 ft. or 12 ft. thick, and from 15 ft. to 20 ft. high; the masonry he calls pseudo-Cyclopean,—that is, of hewn stone, but jointed irregularly. Leake gives the area as equal to not more than a square of 550 ft. Another circuit of walls, scarcely 2 ft. thick, enclosed a lower area, and measured by pacing only 650 yards.

These ruins were the first which Mr. Hughes came upon when he started from Janina on an excursion taken expressly in search of the site of Dodona, which he thus came upon and left unsuspectingly. Yet he remarks with natural surprise on the extraordinary circumstance that a theatre of such vast dimensions should be attached to so diminutive a city. Nay, he even comes so near as to suggest as the only rational explanation that the theatre did not so much belong to this particular city as to the Epirotian tribes in common, or to scattered populations who assembled at certain seasons within the spacious common theatre for the enjoyment of public amusement or the despatch of public business. The sacred character of the comparatively defenceless town was still marked by traces of temples, but not so distinct as they had been a few years previously. In 1813 Pouqueville found the cella and bases of many columns overthrown which a few years before he had seen erect, and various sculptured stones had disappeared. Hughes let go his hold of his clue, as another, who succeeded in grasping it still more firmly, was to do after him, and concluded that the ruins were those of Cassopæa or Passaron, the capital of Pyrrhus, a very unhappy guess. He engraves a rough plan which agrees well with that of M. Carapanos; and mentions that while he was busied with it his friend and fellow-traveller, Mr. Cockerell, was making a drawing of the theatre. Is it possible that this may still exist and may be identifiable? If so the production of it would just now be of peculiar interest. That admirable draughtsman Lusieri also made drawings of this great theatre which he showed to Lord Broughton,—J. Cam Hobhouse,—at Athens; where again are these? They do not appear among the Lusieri drawings in the British Museum.

Colonel Leake, whose sagacity is not unfrequently at fault, but whose conscientiousness, assiduity, and learning never are, makes a most elaborate analysis of ancient testimonies, and collates them with his observations of topographical characteristics, but only to rest in the mistake that the city of Dodona was not Kastritza, a hill above the lake of Janina, and that the town of Janina was the site of the Dodonæan temple. He made some excavations at the true Dodonæan theatre; was it he who found the marble vase which Lusieri mentioned to Mr. Hobhouse had been dug up in the area of the orchestra?

But the nearest hit, which is a complimentary phrase for the unluckiest miss, was made by Dr. Wordsworth; it is to be found in his "Greece: Pictorial, Descriptive, and Historical," of which Lord Broughton says, that "it is a real Book of Beauty, and is as much like real Greece as the portraits in Lady Blessington's Book of Beauty were like their fair originals." However this may be, the Bishop takes up the clue that had already been clutched and then dropped again by the Rev. Mr. Hughes, pursues it with remarkable dexterity, and indeed does all that is requisite for unravelling its tortuosities, and only fails, as it seems, from an apprehension of casting a slur upon authorities by freedom of thought, and of sanctioning independent deference to palpable matters of fact. It would seem indeed only natural that ecclesiastics should have a finer apprehension of the characteristics to be expected in the settlement of a primæval priesthood than an officer of engineers, even though he were so accomplished a scholar as the late Colonel Leake. Even King Arthur's round-table knights prospered but ill, and were but ill-advised when they undertook the quest of the Grail. Dr. Wordsworth justly observed that the ruins of an oracular city must be expected to differ as much from those of a large or small capital or fortress as these from each other, and from this well-selected and commanding point of view he

proceeds to survey the veritable site of Dodona, while still out of heart at discovering it with much less aid than "a response from the oracle itself." Certain inconsistent topographical notices are quite fairly disposed of by referring them to Dodona as an extended district, instead of inferring with others that they must all have been clustered about a centre. He then spots the ruins at Dramisus with the same true instinct which in old days governed the selection of a site for a Benedictine abbey. They stand in a plain, whereas the instinct of the Greek was to build upon and around the base of a considerable hill. All around, and in the midst, indeed, of one of the most mountainous districts of Greece, are pointed hills which rear their heads and present localities most available for citadels, most inviting. For the choice of a level site there must have been some sufficient reason, some deliberate intention. A city so strangely small,—upper and lower together, lying within a circuit of two miles,—could never have compensated by numerous population for such weakness of position. It could not, therefore, be the capital of Pyrrhus Passaron, as most usually supposed; but military weakness was consistent with social importance when the element of sanctity, as at Delphi, and as at Olympia and Elis, was taken into account. In the lower inclosure are vestiges of two temples: of one of them there were fragments of fourteen columns remaining,—more than are to be found altogether in the rest of Epirus. It is vexatious that not one of the travellers gives a hint as to the style of these,—their material or workmanship, and design. The magnificent theatre,—one of the largest in Greece,—is without a parallel in Greece; as associated with a city so insignificant, it must have been built for the accommodation of crowds drawn to this centre by some influence which in ancient Greece had of necessity a religious impulse as its basis.

It must be said that the writer, in combining these considerations, is getting very "warm,"—to borrow a phrase from the game of "hide and seek" of the nursery. But, still further,—he adduces the fact that there are records of a Bishop of Dodona existing in the fifth century, and that the name which the place bears in imperial Byzantine documents of the time, is Bonditza,—to be recognised in the little church of Bodista, near the entrance of the plain from the direction of Janina. Here the explorer is more than "warm," and entitled fairly to cry out "found," but he suddenly drops his argument as if too hot to hold, and adds the lame and faltering apology for a conclusion:—"Considering these circumstances, and the inferences to be deduced from them, we feel disposed to inquire whether contemplating these ruins we are not treading the soil once hallowed by the presence of Dodona?"

It is not easy to imagine a much stronger ecclesiastical contrast than between an English bishop and the servitors of the Dodonæan oracle with whom unwashed feet were obligatory and bed linen an abomination. But otherwise there is a certain moral fitness in a successor from the land of the Druids so nearly discovering,—so narrowly failing to track out,—the haunt of the priests of the oracular oak. There is a lesson here which explorers of more than simple antiquities will do well to take to heart,—to have the courage of their opinions,—to do justice as liberally to their own originality as to that of others. It may seem undesirable in these days to encourage positiveness on the part of those who propound new views; but positiveness of the right temper, such as Mr. Fergusson gives us examples of, in asserting one's own conviction, is not the dogmatism that puts an end to argument. Discovery ever advances by conclusions leaping ahead of evidence,—of such evidence as can be grasped and fixed and forced upon the observations of others, especially of the unsympathic. At this stage the investigator may wisely keep his secret to himself; but inquiry then advances again most decisively by a discoverer assigning the full and just value at once to every new truth that he distinctly and positively proves; then in justice both to truth and to himself he cannot declare his belief too loudly and too positively. Only, as our example has shown, he must be capable of pushing aside authorities out of respect for his own better,—his own common sense, and have the sagacity, of which the chief secret lies in the courage to welcome novelty, to know when a truth is proved,—to know truth, in fact, when he sees it.

It is impossible to grudge to the Greek nation the satisfaction that one at least of the most interesting discoveries upon their own ground has been made by one of themselves,—by one who has shown himself worthy to have made it by the liberality with which he has placed his results before the world in a publication which relies simply upon fulness, accuracy, and studious illustration of whatever it is really of importance that the world should be informed of and have on record. What may be the fate of ancient Epirus in the rearrangement of power which is now at its crisis, it is not for us here to discuss, but it is impossible to look up the search after Dodona in the pages of English travellers, and not have a heavy heart sometimes as we read how inquiries of the victims of the sanguinary Pasha as to the chances of help from without are only answered by explanations that England must needs adhere to an English policy, and that this involved the support of a Government which it was impossible to approve. We may be artists and architects, and antiquaries, but it is as true of us as of Master Shallow and his wiser friends,—"We have some salt of our youth left in us,—we are the sons of women, Master Page," and why should an aspiration be suppressed that the time will yet come round when that healthiest, — that most English, relation of governors and governed which held in ancient Epirus shall be again restored? At that Passaron, which was so long falsely recognised at Dodona, the kings of Epirus were wont, after a solemn religious service, to swear that they would govern their subjects in accordance with the laws; and the subjects took a reciprocal oath that they, in accordance with the laws, would guard the monarchy. (Plutarch. Vit. Pyrrh.)

With the Greek, then, remains the merit of having rescued the question of the site of Dodona from all future cavil and conjecture, however pertinacious; but it still remains to do justice to the clear sense and good services of another English traveller who happily remains with us to be congratulated on the confirmation by the spade of what he has never hesitated to believe and to declare might be certainly inferred independently.

In the supplementary volume of Stuart's "Athens" (pp. 46-7, pl. 111) will be found the plan and details of the great theatre at Dramyssus carefully set forth by Professor Donaldson. It was in December, 1819,—some half-century since,—that the professor that was to be was on the spot. His plate indicates, by the inserted measurements, the labour that he bestowed upon the ruins. He describes it as constructed of the stone found near the spot, worked together with the greatest care without cement; at the same time the simplicity maintained throughout, and the almost total absence of ornament, were interpreted as indications of the remotest antiquity.

But even more interesting is it to find that Mr. Donaldson gave full force to the inferences which Mr. Hughes failed to draw from materials in his own appendix,—the collation of ancient authorities respecting Dodona by Dr. Butler, of Shrewsbury. On the strength of these he renounced the site to which the very excellent Handbook of Greece of Mr. Murray still directs the traveller, or rather now the tourist, and discerned and decided that the disproportion which is so remarkable between the size of the theatre at Dramyssus and the extent of the town was to be accounted for by the necessity of the edifice being sufficiently capacious to receive the vast concourse of people who, on certain solemn occasions, were accustomed to flock to the oracle.

Preaching from Afar. — The *Halifax Guardian* says that a gentleman, well known in connexion with a firm of telegraph engineers in the town, has contrived to have his sermons at home. He placed a microphone in the pulpit of a chapel in the town, and connected it, by means of a private telegraph line, with a house more than a mile away. Every part of the service was distinctly heard by the owner of the house, with the exception of a few words rendered indistinct by the preacher becoming a little excited, and shaking the microphone, the presence of which he never dreamt of. During the week experiments have been made in the schoolroom of another chapel, and the singing of the scholars was transmitted and retransmitted over a number of telegraph lines with remarkable clearness. Carry out the arrangement completely, and one good preacher may stay in his own study and serve a whole town.

CHROMATIC AND DELINEATORY SCALE IN ARCHITECTURAL DRAWING.

THE visitors to our annual exhibitions, in Burlington House and elsewhere, cannot fail to remark a considerable difference in the pressure of spectators in different apartments. On the occasions, unfortunately becoming more and more rare, when some painting of admittedly the highest order forms the centre of an admiring crowd, this fact is easily understood. When we go a step beyond this, we may, perhaps come safely to the conclusion that the general taste of the public is chiefly struck with the exuberance of colour. We are not, it is admitted, a naturally æsthetic people. Northern and Western nations, as a rule, are deficient in the colour sense, as compared with habitual residents in climates where the retina is constantly stimulated by natural tints of intensity such as it requires something like the heat of the present summer to bring out. Thus we generally find that oil pictures, as more fully coloured, attract more attention than water-colour drawings. As to this, indeed, it must be admitted that recent years have witnessed a change. In the Grosvenor Gallery, for example, on a recent visit, it was remarkable how much more attentive were the visitors to the water-colour exhibits than to all but two or three of the oil paintings. For this, we apprehend, there is a reason apart from that more ready impressiveness by full colour which we have suggested to be a general characteristic of the bulk of the exhibition-going public. Water-colour drawing is rising in public favour as an art. It is made matter of study for the young; matter of occasional pursuit for those who are young no longer. If the number of persons who dabble in oil, and of those who try to produce some effect in water-colours, were to be ascertained, there cannot be much doubt that the latter category would be far more numerous. It is, then, as students, or as amateurs, or as observers in some way directly interested in the method of the water-colour draughtsman, that we consider that the bulk of spectators are attracted by water-colour drawings. It is not as a question of general taste, but as a mark of the extension of special study, that the change,—if it be such as we suggest,—may most readily and most satisfactorily be accounted for.

But while, for the above, or for whatever other reason may be suggested, the *queue* formed before such water-colour drawings as "Rose Red and Snow White," "The Manners and Customs of Monkeys," "Fish out of Water," or the remainder of the twelve remarkable drawings by Richard Doyle which hang in the Water-Colour Gallery provided by Sir Coutts Lindsay, is only equalled, in the adjoining rooms, by that which presses to scrutinise the microscopic delicacy of the faces in the "Passing Days" of Mr. J. M. Strudwick, or that is arrested by the audacity of contrast of the pretty dainty little dame in black tripping over the fallen chestnut leaves, the like is far from being the case with regard to architectural water-colour drawings. Of these, as is natural, at the Academy, for example, the *Builder* has long been in the habit of giving special descriptions. And, of course, these drawings command their own public, and that, it may be said, a cultivated and enlightened public. But it is undeniably a small one. Architectural drawings, as a rule, do not attract general attention. Architects will study them. Men who are in want of a house, or of an architect, may look them carefully over. Visitors from the country, who make it a point of conscience to take out their shilling's worth, and do not consider that to be done unless they have looked out the titles of the subjects inclosed in each numbered frame, will glance at them, unless beaten by sheer fatigue before they advance to such high numbers in the catalogue. But the fact remains—there is a woful thinning in the stream of spectators when we come to architecural compositions.

Why should this be the case? We may reply that for many persons *genre* or portraiture has a special charm; and especially that the amusement which may be drawn, or at all events expected, from *genre* pictures, is such as to attract the first notice of nine persons out of ten. As to portraiture, indeed, failing one of three powerful attractions, the ordinary contemporary portrait is rather a thing to shun than to study. These three are—rare and striking beauty in any element of form, tint, or expression; commanding skill on the part of the painter; or personal interest in the subject. When these are all

absent, the portrait of some local magnate in wonderfully blacked boots, becomes a sort of nightmare to the educated eye. With regard to landscape, again, there may be the charm of a truly poetic and masterful reading of some striking aspect of nature. There may be scenery so romantic that even a photographer fails to destroy its beauty, or to eliminate its charm; or there may be the interest excited by knowledge of the scene. When each of these elements of power to act on the imagination is absent, to look at a painted landscape is only like a glance from the window of a railway-carriage at some uninteresting bit of country.

But when we come to architectural drawing, there is to be found, at all events, the possibility of pictorial charm. What idyll, what epic, appeals more strongly to the imagination than does the presence of some great monument, around which the life of Europe has throbbed for centuries? We may look at it as an unbroken link with the historic past, as in the mighty roof which the Second William reared at Westminster, and which yet shelters that noble hall. We may look at it as a mute witness to grave secular change, as in the case of the palace of the popes at Avignon. We may recognise the abiding power of human genius, as in the domes of St. Peter's at Rome, or of St. Paul's in London. We may trace a thousand linked memories, of which the shadows flit under the lofty gloom of the vaulted roof of Westminster Abbey or St. Ouen's Church. We may recall the memory of Roman rule by the towers of London, Rochester, or St. Alban's,—reared as is the latter from the materials of Verulam. We may raise up in imagination the images of the royal, noble, fair, and famous personages who have built, or dwelt in, or been entombed under, so many sites which are rich in architectural and in landscape beauties, no less than in the undying charm of poetic association. We might go on and on—and forget time and space—and yet be far from exhausting the rudest list of the objects suited for the architectural draughtsman in which England is so rich, and of which the charm might be thought to be so magical.

If such is the case with reference to purely representative architectural draughtsmanship, something of the same charm might be thought to attach to the learned and tasteful efforts of the architect to reproduce, for the state or for the comfort of future generations, something of the grandeur or the well-adapted fitness of buildings in which our ancestors were wont to delight. It is not to the lot of every architect that it falls to rear a palace, or a noble hospital, or a great chartered school. But some of the architectural gems which have high, if not the highest, place in the imagination, are of a size and cost which it is within the range of our daily expenditure to reproduce, so that we have the taste. Italy is rich in such gems; but it is not necessary to travel as far as Italy to collect them for the portfolio. The little house in which Virgil is said to have breathed his last yet stands at Brindisi. It might be rebuilt with admirable success on the banks of Windermere, or even of those of the Medway. Many of the seventeenth-century manor-houses, farmhouses, and even town-houses of Surrey are worthy of the reproductive study of the architect. The devastation which has been wrought, within the last ten or twenty years, by "improvement," on one of the richest collections of English architecture of the eighteenth, seventeenth, and even sixteenth centuries, in the High-street of Guildford, is no less than a crime against architectural canons. Invention in architecture is perhaps only pardonable when restoration, reproduction, and congenial improvement and development have done their utmost.

We have dwelt on the capabilities of this branch of art at greater length than we purposed to do. But the reflections to which these hints may give rise are many and valuable. How is it that, if the range of the architectural draughtsman be so great, and the elements which should give value as well as charm to his work, are so numerous and so important,—how is it that we hear the casual visitor say to the party he is escorting through the exhibition,—"Oh, these are only architectural drawings"?

There is a remark made by Mr. Ruskin, in his last charming shilling's worth of art-gossip, which may go far towards the explanation of this difficulty. At all events, it furnishes a hint which it is worth while very attentively to follow out. In the Fine Art Societies' Galleries, 148, New Bond-street, may be seen a bit of unfinished architectural drawing of the rarest delicacy and beauty. And it is undeniable that this beauty depends essentially, in so far as remaining unsupported is concerned, on its being left unfinished. Complete the picture, as a tyro might say, and its chromatic perfection will be gone. How this is so, it is very fortunate that we are able to point out, and that on authority that will be unquestioned. The drawing in question is that of a portion of the Ducal Palace at Venice. "My own study," says Mr. Ruskin, "made in 1874, of the colour of the Ducal Palace in morning sunlight, comes as near, I believe, to the actual facts of the relation between dark and light in the *architecture alone* as attentive care can reach; and it is wholly impossible to get the drawing of the finer details, unless in this delicate and literally true tone, for all the local darks, such as those of the nearer prison-pillars in this sketch, lose their relative power if the lights are put in deeper tone. But the moment sky is added to such a study as this all its detail becomes ghostly and useless; the eye then requires the relation between the nearer buildings and the light at the horizon, or between their shadows and the light of the blue above, and all one's delicate work is lost."

The value of this profound piece of criticism is capital. As made by the cunning draughtsman himself on his own handiwork, it is unusually free from all disturbing influence. It may be accepted wholly, and in its full force. But any one who reads it as a mere apology for an unfinished sketch, or as a criticism on a piece of academical work, will lose the lesson it ought to convey to his mind. Mr. Ruskin's remarks are not always so luminous in their teaching, even if rightly studied. He is too apt,—it is a common infirmity of genius,—to give in a few fiery words the outcome of a long train of thought or of reasoning, and to leap gaps which are utterly insurmountable by those who have not followed the unrecorded intellectual process. We ought to regard such a remark as the above as illustrative of one very luminous case of a general rule. And the general rule is no other than this,—in all pictorial representations of architecture, fidelity, as well as beauty, depend on the observance of chromatic scale. The neglect of aërial perspective is destructive to pictorial effect on the one hand; and the neglect of chromatic balance in composition is no less destructive to that effect on the other hand.

Two principles thus stand out as essential to be observed by those who would distinguish between the architectural diagram and the architectural drawing. These are,—first, the necessity of observing scale in precision of definition; and secondly, the necessity of producing a true chromatic balance in composition. In the diagram, neither of these requisites obtains. It follows, conversely, that the drawing in which they are neglected may be a diagram, but it has no title to the name of a picture.

The essence of the diagram is, that, by a graphic representation, it conveys to the eye information which it is necessary to give in more exact detail than can be given either by words or by a general drawing. In our earliest examples of diagrams,—those which illustrate the propositions of Euclid,—exactitude is by no means required. No doubt the famous *Pons Asinorum* deserves a well-drawn diagram, with clear, even, lines, exact balance of the basal angles, and well-formed letters or figures to aid the demonstration. But the roughest scrawl of chalk on a board, or of a stick on the sand, will answer all the purpose of the most delicately-drawn diagram for geometric demonstration. Beauty in such diagrams consists in exactitude of draughtsmanship, and is, for the mathematician, a luxury,—not a necessary.

When we come to the architectural diagram we make a step in advance. We are yet at some distance from the mechanical drawing proper, which is needed by the engineer, and which ultimately must often be an actual full-sized delineation of the forms to be produced. Such is the case, for instance, with a casting. Before the wooden mould for a casting is made, a full-sized drawing has in most cases to be prepared, from which the model-maker copies his work and takes his dimensions. It is not, of course, always essential that this should be the case. But such may be taken as the normal mode of procedure

When we have to produce work which, on the one hand, is much too large in its dimensions to be drawn out full size, and, on the other hand, is guided by special methods, or by the application of special implements (such as the plumb-line or the square), during its construction, the diagram is, in its proper nature, intermediate between the rough mathematical indication of condition and the accurate delineation of actual contour. Scale is then introduced. An architectural working drawing is a diagram to scale,—exact, as far as the skill of the draughtsman goes, in its proportion, but conveying no pictorial information to the mind. The section of a building is a delineation as purely ideal as is the diagram of the "asses' bridge." The architect and the builder read its short-hand at a glance. But to the man who for the first time is shown a section, it is wholly puzzling and incomprehensible.

When we pass from section to elevation the same rule applies. A geometric elevation is, admittedly, as purely a diagram as a section. And what now comes to be observed is, that a perspective elevation is no less a diagram than a geometric one. A perspective elevation represents, from a given point of view, what a geometric elevation represents if seen from an infinite distance, or as viewed by parallel rays. That is the chief difference.

Now, when it is sought, by sketching-in trees and sky, and perhaps figures, to convert a perspective elevation into a picture, we attempt the impossible. Failure is more or less certain. A picture is—or ought to be—a conception of a whole; in which each detail is on a scale of due subordination. Further, the subordination of these details will depend on the laws of light and shade,—not on those of architectural necessity. A small, pierced, unglazed window, for instance, will assert its presence by a depth of shadow which will entirely distance the force of a main structural element of stability. This the painter will represent aright, because to him it will be visible, and, therefore, true. The architectural draughtsman will fail adequately to represent it, because it will be structurally unimportant, and thus, from his point of view, untrue. Thus the constant opposition between the requirements of the diagram, and those of the pictorial representation (not going so far as the true picture) is continually reappearing, and essentially irreconcilable.

Here comes in the charm of what are called, in technical cant, "bits." A single detail may be represented at once with the accuracy of a diagram, and with the force of a picture. This is impossible, to the same degree at all events, with a multiplicity of details. If we take the architectural drawings of Canaletto, in which we may almost be said to have perspective elevations, we have yet to observe:—First, that we have not so much the perspective of a single building as the general perspective of a group of buildings, which is quite a different thing; secondly, that the pictorial laws of light and shadow are the ruling elements of the linear composition,—not, necessarily, the structural lines; and, thirdly, that the details fade away in precision, in exact proportion to their pictorial unimportance. It would be a very different thing to build a house from a drawing by Canaletto, and to do so guided by a good perspective elevation. The former must be supplemented, either by the knowledge of the architect, or by means of additional diagrams. The latter may be so complete that, if a lens be applied, it will contain almost all the information positively needed by the builder.

In the diagram, absolute scale is wholly unnecessary; fidelity to relative scale,—speaking of the architectural diagram,—is the one absolute requirement. In the picture, absolute scale, or proportion, not only of part to part, but of whole to point of view, is the first necessity. Thus we may fill a sheet of paper with different sketches, each of them of the size most appropriate to give distinction to the features we wish to produce. The effect is admirable. This bit of paper may be beyond price. Attempt to combine the sketches into a picture, and the whole is utterly ruined.

A charming illustration of the truth of these views may be found in the collection of drawings by Mr. Ruskin, to which we have referred above. Thus, with the water-colour drawing of the "Ducal Palace," let the student compare the "Spire and Angle Window at Zug," or the stonework of Roslyn, or that of Lady Glenorchy's Chapel, Edinburgh. Here are truthful bits of delineation, in which architectural accuracy was the object of the delineator, and of which absolute fidelity to nature has made studies quite perfect in themselves. Compare these with the pencil drawing of the outline of the fresco of the "Sacrifice of

Job," in the Campo Santo of Pisa (25 R). This sketch, which is of unrivalled delicacy and beauty, is wholly unfinished,—a fact due, so far as memory serves us, to the state of the fresco itself. But, unfinished as it is, it has all the stamp of a picture. It is not a group of sketches,—a head here and a hand there,—it is only an imperfect, broken, but most precious adumbration of the relics of a mighty whole. An attempt to combine an accurate representation of the structural portion of the wall of the Campo Santo with a transcript of the dream of Giotto would be a predestined failure. We see how a man who has earned, by hard study and masterly work with brush and pencil, the right to speak with a sort of inspired dogmatism,—has wrought in these two different styles,—how he has reflected architectural detail, how he has conceived of the pictorial aspect of nature; but we cannot conceive that either the sketch of detail or the group of landscape should be combined with a perspective elevation from which a builder might construct a house, or after which a proprietor would order one to be built.

It is by keeping clearly in view the difference between the diagram and the picture, the technical direction and the pictorial conception, the requirements of architecture as an industrial art, and her requirements as a fine art, that architectural draughtsmanship may be redeemed from that degree of discredit which we fear too justly attaches to it. We have read somewhat between the lines of Mr. Ruskin's notes. But we have little doubt of the accordance of our remarks with the views which he would desire to support. The diagram is a production in which skill and industry will enable any patient and resolute student to attain ultimate excellence. It is producible by the genius of hard work. With all respect for Mr. Kingsley's quotation from Turner,—"I know of no genius but the genius of hard work,"—the production of anything that shall irresistibly charm as a picture requires something of a very different order. We should like to have an estimate of the amount of hard work, and *nothing else*, that would produce a rival to Mr. Ruskin's "long-coveted drawing of the Splugen."

SANITATION AT THE PARIS EXHIBITION.

To continue our observations on the various structures situated in the gardens outside the main building of the Exhibition, we fail to note anything of particular interest from a sanitary point of view, after leaving the Belgian annexe, till we reach the English machinery and agricultural annexe. Here we find the patent agate-centered ventilators of Messrs. Fellowes & Bates, of Manchester. This patent merits the consideration of persons interested in the subject. It consists of a cowl, or smoke-conductor. The hood is armed on its summit with curved vanes, which act as sails under the pressure of the wind, and cause the ventilator to revolve, while the side-vanes permit the escape of the vitiated air. Beneath the aperture an archimedian screw is connected with the hood, by means of a central cast-steel shaft, from which it derives its rotary motion, and thus produces a continuous up-current. The whole being pivoted on a polished agate bearing, there is no risk of fire from the giving way of oil-cup fastenings, and the wear and tear due to friction are considerably reduced. In large workshops, factories, &c., it is suggested that, to secure more regular action, and to obtain good ventilation even when there is no wind, steam or other power should be connected with the screw, so as to make the cowl revolve at a given rate whatever the condition of the weather. How far this ventilator acts in practice it is impossible to judge from the mere contemplation of the cowls exhibited, but the English commissioners have determined to try its efficacy in their own annexe. This is a long ill-ventilated building, which, when the sun shines, certainly becomes very hot; but we are to see what two ventilators, 36 in. in diameter, driven by steam, and two 18-in. ventilators driven by wind, can do to relieve the closeness. The firm have calculated that their 36-in. ventilator driven by steam should make 130 revolutions per minute. At this rate it will extract 5,600 cubic feet of air per minute. If the ventilator is smaller in diameter, the reduction does not correspond in due ratio, for an 18-in. diameter driven by power will only extract 900 cubic feet of air per minute; that is, a sixth instead of half the quantity of air drawn up by the ventilator twice its size. We would suggest, however, that these calculations should be gone over again by some person totally disinterested in the patent. If it can be confirmed by independent evidence that a ventilator 36 in. in diameter, costing, comparatively speaking, but a trivial sum, can, when working under power, draw out of a factory or other similar building about 336,000 cubic feet of air in an hour, the knowledge of the fact will prove of the utmost value to the proprietors of the patent and to the general public.

Leaving the English annexe, passing the Australian log-hut, which, with all its crevices, suggests at least ample ventilation, a little kiosk will be found erected by the society for providing limbs to the poor and mutilated. Here a young woman with a wooden arm, hand, and fingers distributes circulars and explains all the conveniences of the apparatus which admirably replaces the lost limb. The Société d'Assistance aux Inutilés Pauvres, 43, Rue de Verneuil, Paris, has done much, with slender means, to relieve human suffering; and, while the ingenious mechanism of the false limbs supplied is really curious and worthy of inspection, the charitable objects of the association commend themselves more forcibly to public sympathy and support.

Not far from this exhibit will be found the magnificent ambulances of the French Society for the Assistance of Wounded Soldiers. Apart from a great variety of ambulance wagons, there is an entire ambulance railway-train. The train forms a long series of rooms united by platforms, so that the attendants can walk from carriage to carriage. One carriage is a store-room for provisions and medicaments, the next for linen, the third is disposed as a kitchen, with a large kitchener, a sink, and everything complete for the most extensive cooking; then there is the doctors' consulting-room and bed-room, elegantly and comfortably fitted up; after that we have a day-room or dining-room, with a number of benches and tables; finally, we have the carriages where the wounded must lie. One is fitted up with regular beds, the other so arranged that the stretchers themselves, hung from the roof, are used instead of beds. In the one carriage everything is done to ensure comfort; in the others the chief object is to take up as many wounded as possible. A railway train thus disposed is, to say the least of it, a strange spectacle; but when we consider the terrible meaning of all these preparations they strike a note of discord in the midst of this great gathering of peace, industry, and concord. A wooden ambulance, with the library of the society, partially hides the train from view, and next to it there is an ambulance tent for the beds, with the double canvas covering system of ventilation, which has been often described. The rough-and-ready warming system is also exemplified; and this tent recalls the tents established in the Avenue du Bois de Boulogne by the American Ambulance during the siege of Paris. Here, in consequence of the admirable ventilation, and the absence of hospital fever, operations which could never have been attempted within doors, were successfully accomplished. The value of ample ventilation was never so triumphantly demonstrated, and the wounded nursed in the American ambulance were certainly the most favoured by the chances of war. Nor is a canvas hospital incompatible with warmth, for we have rarely a more rigorous winter than that of 1870-71. A hole is dug at the back of the tent about 4 ft. deep. Here a stove is erected, and the heat is conducted by flues into the tent. We next come upon a long wooden hospital, so contrived as to be easily removed and reconstructed elsewhere. Between the two flank walls, perforated bricks, or plaster, or stucco composition may be introduced, and so contrived that a continual current of air can be maintained within the wall. For the ventilation of the ward itself, there are little openings on the level of the floor, one for each bed, and in the elongated lantern-shaped roof side openings about 1 ft. high and 3 ft. in length at a distance of 5 ft. from each other, allow the heated air to escape. That ventilation is the subject of minute study can be gathered from the fact that the four lanterns at the end of the ward are shut off from the room, and have tubes conducting the air they consume to the outside. Further, to ensure a plentiful supply of purifying light, there is nearly as much window-room as wall-space. The windows face each other, and are protected by protruding awnings which shade but do not exclude the light.

Nearing the bridge that crosses the Seine, we pass by Mr. Lascelles's reproductions of English cottages, which will not fail to interest the French and their foreign visitors, though the style of building is familiar enough to us. There is a cleanly neatness, combined with a certain picturesque effect, which distinguishes these typical structures.

Crossing the Pont d'Jena, and entering the Trocadéro gardens, we find, immediately to our left, the Café du Maroc, the Tunisian café, and a Turkish bazaar, where tawdry, and at times dirty, Orientals sell trinkets, and scent the air with the smoke of pastilles. The scene is picturesque, and, above all, strange to Western Europeans, but there is a catch-penny element about it which, if typical of Oriental bazaars, detracts somewhat from the dignity and imposing aspect of an International Exhibition. The diminutive reproduction of the Shah's palace at Teheran is an exhibit equally typical and far more dignified. We attempted in vain, it is true, to obtain from the Persian attendants some notion of the sanitary arrangements of the royal palace, but the scene in itself was ample reward for the trouble of the visit. The eccentric roof, imitating large crystals, the cool effect of the fountain playing in the centre of the ground-floor room, the beautiful carpeting, and the coloured light streaming through stained glass, on the swarthy faces of the Persian attendants, all contributed to embellish a picture which, if easy to criticise, as scarcely in keeping with the principles of high art, presented nevertheless all the charms of the wildest phantasy.

As an abrupt contrast, the Norwegian and Swedish wooden houses stand close by the Palace of the Shah. Here, at least, we can find the trace of some knowledge as to the preservation of health. An opening is formed under the floor of the rooms, and conducts the outside air to the back of the stove, where it is warmed, and then admitted into the room. The walls are of varnished wood, which can be easily washed. There are two walls, each of planks 1 in. thick, and the space between is generally filled up with sawdust and clay, which is considered an effective method of keeping out the cold. There are, we noted, generally some contrivances for opening the upper part of the windows; and the closets are, as a rule, built outside and away from the house, notwithstanding the fearful severity of the Scandinavian winter.

Still further to impress by force of contrast, the Chinese house and bazaar come next. Here there has been an evident attempt to build something gay, but which has, nevertheless, a melancholy element in its general appearance. This is due perhaps to the mournful slate-coloured roof combined with dull red wall paint. Within, the astounding Chinese drawing-room, with arm-chairs and little tables fastened all together in a row, the stools that seem like upturned drums, and the gaudy decorative work, are all well worth examining; but there is no one at hand to explain the more intimate details of the Chinese household life.

Turning back towards the centre of the Trocadéro, and on a higher portion of the incline, we find the Egyptian house, containing some very fine plans, in relief, and drawings of the Suez canal, and giving the fresh water canalisation which supplies the domestic want of the various stations along the canal. Here also is exhibited the cap worn by Livingstone and the revolver Stanley gave him. These, with some rough drawings, make silent but eloquent appeal against the African slave trade.

The Japanese garden now alone separates us from the avenue leading to the central fountains and waterfall. This garden, with the hut in the centre, its strange doorway, surmounted with a remarkable wooden cock and hen, are peculiar, quaint, and yet not forced and obstructive.

Coating for Woodwork.—Good lime slaked with sour milk, and diluted with water till it is about the consistence of ordinary whitewash, is recommended by the *Landwirth* as an excellent coating for woodwork. Fences, rafters, partitions, &c., are, it says, effectually protected against the weather for at least ten years by this application. The casein of the milk in combination with the lime forms a permanent film, which dries so quickly in warm weather that heavy rains falling directly after it has been laid on will scarcely affect the work.

FIRES IN THEATRES.

IN resuming our notice of Herr Fölsch's valuable work on "Theaterbrände," * a labour which affords us extreme pleasure, we think it advisable to lay some further information from its pages before our readers, before proceeding to discuss the important step taken by the Board of Middlesex Magistrates in issuing the regulations for preventing fires in buildings over which they have control.

A few additional statistics, taken from the list of theatres destroyed by fire, contained in the work of Herr Fölsch, will teach us, if instruction were needed, how highly dangerous our modern stages are. Nearly every theatre in London and Paris has been burnt down in its turn; in London alone, to the number of thirty-one. During the last thirty years, fifty-seven fires were officially recorded in London, and a great many fire alarms may have never come to the knowledge of the authorities. No better criterion of the combustible nature of play-houses can be formed than by looking at their respective ages. The author has been able to collect exact data with that view of 252 theatres. Of these, there have been burnt down:—

5	theatres	before opening;			
70	,,	in the first 5 years	after	opening;	
38	,,	,, 6 to 10	,,	,,	
45	,,	,, 11 to 20	,,	,,	
27	,,	,, 21 to 30	,,	,,	
12	,,	,, 31 to 40	,,	,,	
20	,,	,, 41 to 50	,,	,,	
17	,,	,, 51 to 60	,,	,,	
7	,,	,, 61 to 80	,,	,,	
8	,,	,, 81 to 100	,,	,,	
3	,,	over 100 years	after	opening.	

Total 252 theatres.

The abnormally great number of theatres burnt down in the first five years after being opened is explained partly by the fact that most of them were wooden erections, or merely provisional buildings, which, of course, are of the most dangerous nature. The above figures show that the average age of those theatres destroyed by fire amounts to about twenty-two years and three-quarters. Carrying inquiry a little further, we find that the 516 theatres burnt down were distributed over the globe as follows. They included:—

176 in the United States;
68 ,, Great Britain, exclusive of the Colonies;
63 ,, France;
49 ,, Germany;
45 ,, Italy;
26 ,, Austria;
24 ,, Russia;
17 ,, Spain and Portugal;
30 ,, the various European countries;
18 ,, the various extra-European countries.

A comparison of these figures does not permit of forming an opinion as to the more or fewer fires in theatres in the different countries; but they are a safe index of the care bestowed there in collecting the required data.

It is further interesting to observe the time when theatres generally burn down. On the average, about thirteen theatres are destroyed each year; the worst months being from January to March, the fewest fires taking place in July to September. Most of them have taken place in the middle of the week, the most fatal days in the month being, strangely, the 8th, 15th, and 22nd. Fortunately, of the many conflagrations chronicled in the work, only thirty-six broke out while representations were going on; but these have, on the other hand, been the most disastrous on record. Most of the fires took place in the middle of the night; taking the risk of theatres to catch fire during the day at one, 6·8 represents the liability about two hours after the conclusion of the performance.

Another point, which has been referred to only in passing in our former notice, and which is generally too much neglected, should not be lost sight of. It is the extreme rapidity with which conflagrations generally spread in theatres, leaving no time to save anything, and involving too often great sacrifice of life. A case in point is the destruction of the Berlin Opera on August 18th, 1843. On that evening the military ballet, "The Swiss Soldier," in which guns are fired and fireworks let off, was represented. At the inspection, half an hour after the end of the performance, there was not the slightest sign of fire. Soon after, however, flames were seen issuing from the right side of the stage, and ten minutes later the whole building was one mass of flame. The old Opera, like the present one, stood completely isolated, and yet it required the utmost exertion to save the surrounding buildings from taking fire. At the destruction of the Munich Court Theatre on January 14, 1823, it was with the greatest difficulty that another theatre close by, the Royal Castle, and other important buildings were saved. In too many cases it has not been possible to arrest the conflagration, and to confine it to the theatre on fire. Among the many catastrophes of this description of older date may be mentioned the first destruction of Drury Lane Theatre (January, 1672), when sixty other buildings were destroyed; the burning down of the provincial theatre in the courtyard of the Royal Palace of Amalienborg, near Copenhagen (April 19, 1689), when the destructive element annihilated the whole palace, the park with all its buildings, and endangered even the fleet in the roadstead.

Of the more recent fires of this nature, let us only refer to that of the English Opera-house, (February 16, 1830), when fifteen neighbouring houses were destroyed. The fire which broke out in the Olympic on March 29, 1849, either entirely destroyed or greatly damaged twenty other houses. It may be asked, confining the inquiry to London, in how many cases would a fire in a theatre *not* involve the destruction of surrounding property?

In looking into all these cases, let us not forget that through fires in theatres immense sums are year after year entirely lost. And yet we are not growing wiser. It is true that nearly all theatres are insured, and pay a high premium. But no one will assert that those premiums even approximately cover the heavy payments that have to be made by insurance companies, and through them by the public at large. Yet those pecuniary losses are nothing to the sacrifice of life which in nine cases out of ten accompanies fires in theatres. Quite apart from the vast number of lives (both of actors and spectators) that have been lost at the outbreak of fire during performances, the life of firemen and others whom duty calls to assist in extinguishing fires is greatly endangered in conflagrations of unusual vastness, and it is no wonder that we frequently hear of their falling victims in performing it. At the fire of Covent Garden Theatre, on September 20th, 1808, no less than twenty persons so employed lost their lives. At the destruction of the Royal Theatre, in Edinburgh, a great many lives were thus lost; and the list of fatal accidents to firemen in foreign theatres is equally large. This sad loss of life arises generally from the non-acquaintance of the firemen with the interior of theatres, the rapid spread of fire and smoke soon barring all egress to those who venture rashly too far into a burning building. Instances are reported where even those engaged in theatres, and supposed to know their way about them, have perished in attempts to save valuables. There is a terrible case on record, in which the cashier of the Kärnthmerthor Theatre of Vienna and his wife lost their lives under most distressing circumstances. The house was in full flames, when they both rushed back to save the cash-box. Before they could return, however, the flames had reached the staircase, and both died a miserable death, in full view of many people, because the grated windows behind which they were vainly calling out for help could no longer be reached and broken open.

Both more disastrous and of a far more shocking nature are fires in theatres, if they break out during performances. The great danger threatening hundreds and even thousands at the same time; the coincidence of many circumstances which, in ordinary cases, would appear trivial, but upon which depend the lives and the health of many people; the dire fate which makes victims of hundreds at the same moment, — all these combine to make up a picture against the recurrence of which we ought to guard, and yet against which so little has hitherto been done. In the work under notice, a list is given of thirty-six fires in theatres which occurred during representations. It is not our intention to particularise them here; but those of our readers who take an interest in them will not regret the time spent in perusing the part of the book dealing with them. For notwithstanding all that has been asserted to the contrary effect, viz., that fires in theatres rarely begin during representations, and that the catastrophe of Brooklyn was unexampled, they will see that experience says otherwise. Since 1770 no fewer than thirty-six were burnt down while performances were going on, and in most cases the loss of life has been frightful.

There is no doubt that effective measures against fires in theatres are imperative. While searching for the best means for preventing them, an inquiry into the origin of those fires is of great value. But in by far the greater number of instances it has not been possible to trace their causes. In this country the verdict of the jury is similar to that found after the destruction of Covent Garden Theatre, in March 5, 1856,—namely, "That the theatre has been destroyed by fire; but that there is not sufficient evidence before the jury to say how the same originated." In other countries where no such juries exist, in most cases, after a fruitless inquiry, the subject is silently dropped. The reason why, only in rare instances, the causes of the fire are established, is to be sought in the rapid spread and the destructive effect of the conflagration. The thick smoke arising at once obscures all observation; the extraordinary haste and confusion render even subsequent evidence of eye-witnesses unreliable, and such traces which might possibly lead to a discovery are obliterated by the rapidly spreading flames, so that there remain only assumptions upon which to proceed.

Most certainty exists with respect to fires which break out during performances. They are caused either by badly protected or naked lights, or by leaky gaspipes, or by careless handling of the gas, or by gas explosions. Other fires have arisen from the employment of petroleum for lighting, or through careless smoking, or through firing of guns or letting off fireworks. Fires, finally, have been caused by the faulty condition of the heating apparatus. In all these cases, carelessness with respect to all those dangerous appliances has been at the bottom of the outbreak. And yet we are going on in the same course.

It has already been remarked that the rapid inflammability of our theatres arises from the large quantity of material easily set in flames, and stored up within a narrow compass, which has been dried up by continually applied heat, and thus prepared for combustion, but also from the extensive way in which a theatre is lighted up. This danger is considerably increased not only by the frequent use of very thin stuffs, which are on that account set ablaze all the more rapidly, but also by the more or less fine or coarse threads of the canvas employed for decorations, which depend from them after frequent use, and which act like slow-matches for the fire. The dust also which settles on the decorations, and which consists mostly of thin fibres, favours the spreading of the flames, so that in an incredibly short time after they once get hold of the objects within their reach their extinction becomes a matter of impossibility. A fire breaking out must consequently be promptly stifled, or the whole house will be in flames. Experience tells us that such a danger sets in very frequently, or more often than is generally believed, in wider circles.

Theatres which are exposed almost daily to destruction by fire ought to be constructed as much as possible of fireproof materials. The application of the latter to buildings was fully discussed at the recent Conference of Architects, and it is needless to refer to it here again. We trust that the valuable suggestions made will be put into practice, especially for theatres.

Having thus pointed out the most essential features of the work before us, we may pass on to the second part of our subject, the regulations adopted by the Middlesex magistrates for the prevention of fires in concert-rooms, music-halls, and dancing-saloons. By a singular coincidence, the new regulations were brought to the notice of the public the same day that the issue of our journal containing the first article headed as above was passing through the press. Of the opportuneness of the precautions thus wisely taken, there can be no question; and an examination of the new regulations will, therefore, not be without benefit. It will assist us in forming an opinion as to their application to London theatres. A scrutiny of them will be all the more interesting if we view them by the light supplied by the excellent book we have referred to. There is only one exception we have to make to the regulations, and that is that they do not deal at all with the construction of buildings to be used for concert-rooms, music-halls, or dancing-saloons. For this purpose comprehensive rules ought to be laid down, and they will probably not be omitted in the legislation which is reported to be contemplated for theatres.

It is hardly conceivable that the measures taken by the Middlesex magistrates will be without some salutary effect in stirring up action in this

* See p. 423, *ante*.

direction. After the example set by that body, we should think the necessity of adopting similar provisions for theatres will be recognised. The protection of the theatre-frequenting public being absolutely necessary, we are sure Parliament will not be backward in furnishing the requisite authority. Action of some description has become a necessity, and the sooner it is taken the better for all concerned. It is a crying shame that thousands of lives should depend upon the good-will of theatrical managers and proprietors. Admonitions issued by the Lord Chamberlain are so much waste-paper. What is wanted are stringent regulations, non-compliance with which ought to be visited by such heavy penalties as would render it more profitable to proprietors of theatres to go to the expense of remedying the evils complained of than to expose themselves to the expense of prosecutions. The regulations issued by the Middlesex magistrates are to the point, and may well be applied also to the theatres, and as so much has been done with respect to buildings over which they have control, and which, it should not be forgotten, are ever so much less dangerous with regard to fire than theatres, it seems only natural that some decisive action should follow with a view to the better regulation and supervision of our playhouses. It will be,—in fact, has been,—admitted on all hands that things cannot go on as at present. Spasmodic efforts will do little to advance the reforms so much required.

Let us now, finally, consider the new Regulations, in connexion with their application to theatres, treating them *seriatim*:—

Exits.—1. "All doors and barriers to open outwards." 2. "All gangways, passages, and staircases, intended for the exit of the audience, to be kept entirely free from chairs or any other obstructions, whether permanent or temporary." 3. "All doors not ordinarily used for exit, but available as additional means of escape in case of alarm, to be indicated by printed notices or printed placards in plain characters." The point treating of the provision for ample and proper exits is such a vital one that we may well be permitted to add a few words to what has already been stated. No doubt the question is of the utmost importance. Upon its proper solution depend the life and safety of the public, which, without being able to test for itself the sufficiency and practical nature of the exits, and confiding to the humanity and conscientiousness of managers, and the care of the Government, frequents public places of entertainment, and very often fills all available space to the last place. This confidence, unfortunately, is too often abused. The heavy losses of life and health accompanying, in too many cases, fires in theatres are too well known to require confirmation. We are astounded at the absurdity which was disclosed at the destruction of the Canton Theatre, on May 25, 1845, how thousands of people were inclosed within four high walls with only one exit, the interior being filled with highly inflammable material—and attribute the frightful loss of life involved to Mandarin government. The catastrophes recurring with an almost deadly regularity show only too plainly that most of our theatres are no better off in that respect. The apathy of the public in the matter is something wonderful. Only when extreme cases occur in too close proximity for the public to slumber on in comfortable security are they roused up to such a pitch as to lead to the abolition of the most crying evils. Will any person care to say that the case is overstated?

Water Supply.—4. "An ample supply of water, with hose and pipes, to be available to all parts of the building, where possible, on the high-pressure main." It has already been pointed out that fires in theatres spread with such rapidity that, if energetic steps are not taken at once to suppress it, later efforts are, in most cases, unavailing. On that account, every theatre or place of entertainment ought to be supplied with ample means of extinguishing fires. The first requisite is a large supply of water, with pipes and hose to all parts of the house, to which may be added that one or more men, according to the size of the building, ought to be stationed in the different parts of the house, in charge of the hydrants.

Protection of Lights, Wet Blankets, &c., Gas-pipes.—5. "All fixed and ordinary gas-burners to be furnished with efficient guards." 6. "No white-metal gas-pipes to be used in the building." 7. "Where there is a stage or wings with scenery, the footlights or floats to be protected by a wire guard. The rows or lines of gas-burners at the wings are to commence 4 ft. at least from the level of the stage. Wet blankets or rugs, with filled buckets or water-pots, to be always kept at the wings, and attention to be directed to them by placards, legibly printed or painted, and fixed immediately above them. Some person is to be held responsible for keeping the blankets, buckets, &c., ready for immediate use. Hatchets or other means to cut down hanging scenery, in case of fire, to be always in readiness." Here also the old maxim holds good, that "prevention is better than cure." The great heat developed by gas is a danger which can only be safely met by carrying out strictly a series of precautions. In the first place, gas ought to be laid on systematically, and only the best workmen should be employed in fitting it up. Too often this is not the case. The necessary works are given to the man who tenders lowest. In all complicated arrangements, the advice and services of a competent man ought to be secured, even for smaller theatres. The gas for the stage and that for the auditorium ought to be supplied from separate meters, placed in widely different parts of the house, and, if possible, from different street-mains. The protection of the gas-jets ought to be of the very best description, and they ought to be guarded in all directions. In the best theatres of recent construction the lighting up is effected by electricity, another safeguard against the outbreak of fire. Besides the fixed lights, the exigencies of the modern stage require a great number of movable lights. The pipes, of necessity made of a flexible material, are exposed to constant rough usage, leakages occur, and it is a wonder that explosions of gas do not take place more often. The use of such pipes is to be greatly deprecated; it ought to be as sparing as possible. Altogether, the supervision of the gas-conduits and the meters should be placed in the hands of an experienced mechanic, who must be a man of quick resource in case of danger; for upon him, indeed, depend the lives of hundreds of people, prompt suppression of any outbreak of fire being the sole remedy. The same remarks apply to the person in charge of the heating apparatus.

Here it may not be amiss to point out the importance of making theatrical dresses, especially those of members of the ballet, of fire-proof material, or at least of such material as will not readily transmit flames. The cases in which performers, in too many instances most eminent artists, have lost their lives after unspeakable sufferings, are unfortunately only too numerous. Of casualties in English theatres, let us mention that of Miss Clara Webster, on December 14, 1844, at Drury-lane. Her dress caught fire on the stage; two days later she died of the consequences of her injuries. On February 10, 1863, the dress of a *danseuse* in the Princess's Theatre was ignited by Bengal fire in the transformation scene; she met with a happy release from her sufferings four days later. On April 29, 1870, in the theatre at Northampton, Miss Lily Davis fell on to the footlights, and died of her injuries. On October 8, 1873, Miss Ellen Pelly, a member of the ballet at the Alhambra Theatre, was almost burned alive on the stage; she expired shortly after at Charing-cross Hospital. All these cases prove that something ought to be done, but that effectual protection can only be secured by rendering the dress materials uninflammable. Those casualties might possibly have been prevented, or at least mitigated in their consequences, if wet blankets had been kept in readiness on both sides of the stage, which unfortunately is not the case in all theatres. The nonchalance and happy-go-lucky way of the authorities in this direction were stigmatised, for instance, in the verdict of the jury on the fatal case in the Alhambra Theatre, which was described, it is true, as an "accidental death," with the timid rider that wet blankets ought to have been kept in readiness, in order to quickly check similar occurrences.

It has been, we venture to think most unjustly, observed that in most cases the person injured had come carelessly too near a light. Artists, whether of high or low degree, are far too much engaged in their respective characters to be able to pay a great deal of attention to their surroundings. At present there is an abundance of proved means to render light stuffs and whole dresses incombustible. It may surprise a great many to be informed that fire-proof substances have been used for the last twenty years in the royal laundries for all curtains, ball dresses, &c. The example set by her Majesty has found imitation in this country. In some isolated instances it has been followed on the stage. Thus, in the Royal Park Theatre, at the representation of "Notre Dame," *Esmeralda*, surrounded by flames, was rendered fireproof by means of a Nicholl's patent dress. This fact was largely advertised last year. It is a great pity that such protective measures are taken in so few theatres.

Regulations.—8. "The regulations as to fire are to be always posted up, in some conspicuous place, so that all persons belonging to the premises may be acquainted with their contents." The importance of this provision is so obvious that further remarks are hardly required.

Inspections.—9. "An annual inspection will be made of all music-halls, particularly with regard to the appliances for the prevention of fire and accidents therefrom, and the means of exit from the building." As has already been insisted on in our former article, those inspections ought to be made at all times, no notice whatever being given to managers, so as to come upon them unawares, and so detecting at once any shortcomings, which otherwise, if notice were given, might be hidden.

Alterations.—10. "No structural alterations are to be made without the sanction of the justices of the special sessional division in which the building is situated, in petty sessions assembled, or their surveyor. Plans of all alterations so sanctioned to be sent to the office of the clerk of the peace, and reported at the following annual licensing day." Whenever it is found advisable to sanction any alterations, the latter ought to be of such a nature as to still further increase the safeguards against fire.

Conditional Granting of Licences.—12. "In buildings to which these regulations apply, licences will be granted only when the above regulations are carried out, and on the express condition that these and every other reasonable precaution against fire, or the danger arising therefrom, are adopted." It is high time that this regulation were applied to all theatres.

Responsibility.—13. "The person or persons in whose name the licence is granted will be held solely and entirely responsible for the carrying out of the above regulations for the due management of his music-hall, and for the safety of the public and *employés*." The responsibility here spoken of is very properly fixed upon the managers of public places of amusement. But the fact should not be lost sight of, that the public are greatly to blame in the matter as well. As it would be vain, however, to expect pressure to be applied on the part of the public, the responsibility of taking some steps rests upon the authority which is generally supposed to be entrusted with the guardianship of our theatres. That much-abused body, the Middlesex magistrates, have set an example which, while it deserves the warmest acknowledgment, we sincerely trust will find imitation in the case of our theatres. Even at the risk of becoming tedious by argumentative reiteration, nothing shall deter us from repeating arguments already advanced, believing that some good may result from their constant application. The public is greatly excited and stirred to its very depths by some dreadful disaster which each individual fears he might be involved in some of these days. But the momentary timidity passes off; a few months after a catastrophe the effects of the first impression have worn off, and perhaps a year hence the calamity is talked of with perfect indifference. This, it will be admitted, is an unvarnished statement with regard to the public. And it is equally true that the great mass of the public, at least in Europe, will not keep away from motives of prudence or fear from frequenting dangerous theatres. Curiosity and a love of sight-seeing will always gain the upper hand with them. The humanity, foresight, and intelligence of theatrical managers have led to many measures of precaution being adopted to guard against fire. But other proprietors of theatres are more or less indifferent to this question, or have been lulled into a state of security by a number of instances in which fortunately fires have been promptly quelled. Others, again, have only a sense for momentary gain, or else they are without the means of providing efficient safeguards. Little is to be expected from those engaged in theatres; actors and actresses, from long habit, are mostly indifferent to the danger. As has been pointed out, much is to be expected from fire insurance companies, for their interests, notwithstanding the high premiums paid for theatres, suffer greatly from their destruction.

The principal responsibility, however, rests with the Government which permits such a state of things to continue. It is to the authorities that we must look for an improvement. In America, public opinion is very powerful, and it has succeeded during the last few years in forcing theatrical managers and proprietors to adopt radical measures of safety. The United States Government are merely driven by the force of public opinion to devise the necessary measures and to make them obligatory. On the Continent of Europe people are so thoroughly used to let the respective Governments think and act for them in these and similar matters of public safety that little action on their part is required. We heartily approve of paternal government if it is directed to such laudable objects, and intercession on the part of the public would seem almost superfluous.

It is only in this country that we witness an amount of indifference which borders on criminality. An entirely ineffectual control is exercised by an authority which has to take care that our morals shall not be corrupted, but which dares not interfere where its interference is most needed. No fault can possibly be found with the Lord Chamberlain. He acts within the very much prescribed limits of his jurisdiction. It is to the conscience of our legislators that we must look for improvement, for safety of life and limb will hardly ever form a crucial question in any contested election. Perhaps they are awakening to the necessity of doing something. Is the action taken by the Middlesex magistrates a sign that better times are coming? It would be a scandal indeed if that were neglected to be done for theatres which has just been effected for music-halls and other similar places of entertainment. The magistrates have used the powers which are vested in them for a very wise purpose, and should their action lead to similar measures being adopted for theatres, the public will remember them with gratitude long after the institution of a licensing magistracy has passed away.

MEASURES AND WEIGHTS.

MUCH gratitude is due to the late Warden of the Standards for the patient and intelligent care that he has devoted to the important subject of official metrology.* The scientific questions involved in the use of weights and measures have long engaged the attention of some of our most eminent men of science, several of whom have been members of the various standard commissions appointed from time to time by the British Government. The International Metric Commission assembled at Paris a large body of scientific men from all civilised countries; but information on this important subject has been hitherto far from accessible to the general public, having been confined to a few papers published in the "Philosophical Transactions," reports of the several Standard Commissions, and a few other Parliamentary Papers. Of these the most important are the accounts of the construction of the imperial standard pound, by Professor W. H. Miller; and of the new imperial standard of length, by the Astronomer Royal.

The subject of measure and weight has been treated by Mr. Chisholm under the following heads:—1. Definition of weight and measure. 2. Ancient standards of weight and measure. 3. The restored standards, imperial standard pound and yard. 5. Secondary imperial standards, including multiples and parts of standard units. 6. Derived units of imperial weight and measure, with scale of multiples and parts. 7. The metric system. 8. Weighing and measuring instruments, and their scientific use.

In investigating the subject of weight,—our acquaintance with which, however, must be regarded as posterior, in point of history, to our study of measures of distance, of area, and of capacity,—no work that has come to our knowledge has hitherto stated the ultimate law of gravitation in its utmost simplicity. That statement is, that gravitation is a force inherent in matter, acting in radial lines; proportionate in its force to that property which we call the specific gravity of the matter in question, and undiminished by the fact of distance. Against the latter clause, of course, the objection will at once be raised that attraction is known to act with a force inversely proportioned to the squares of the distance separating the bodies attracting one another. But that fact, so stated, is an empirical deduction alone. From our preceding definition the line of inverse square is a logical deduction. For if the gravitating force of a planet, or any other body, act in radial lines, the portion of such force which can affect any other body must be in inverse proportion to the squares of the distances. This may be illustrated by supposing a series of concentric hollow spheres. The centripetal force, tending to a central mass, would be identical on the whole surface of each sphere. But if we took equal areas of the surface of each, the force acting on such areas would be proportionate to the part which these areas formed of the whole shell, or hollow sphere, to which they belonged. That is to say, the local attraction varies inversely as the square of the radius of the sphere. This conception of the unvarying action of the force of gravity is one of a very suggestve nature.

The determination by Colonel Clarke, and one according to Captain Kater's equivalent, of the length of the polar and equatorial axes of the earth, of the length of the meridian quadrant of Paris, and of the minimum terrestrial quadrant, which is that of long. 105° 34′ E., are given at p. 9. According to Colonel Clarke's results (which were computed from a combination of all the separate measurements of arcs of meridians in Peru, France, Prussia, Russia, Cape of Good Hope, India, and the United Kingdom), the length of the mètre at 32° Fahrenheit is equal to 1·09362311 yard at 62°; that is to say, to 3·28086933 ft., or to 39·37043196 in., instead of the more generally received determination by Capt. Kater of 39·37079 in. Sir H. James states, in his preface to Colonel Clarke's work, that the longest meridian is in 15° 34′ east longitude, nearly corresponding to the meridian which passes over the greatest quantity of land in the Eastern, and opposed to that passing over of water in the Western, hemispheres.

The chapter on the ancient standards of weight and measure is the least satisfactory part of the book, for the natural reason that the workmanship here is almost exclusively literary, and that the author is compelled to rely on authorities whose research and ideas of accuracy are by a long way inferior to his own. The statements of Babylonian, Assyrian, and Judæan weights have been investigated in the "Bible Educator" with a degree of care that demands recognition in any future work on the subject. The determination, taken from the Talmud, of the ordinary Jewish cubit of 48 barley-corns, or 16 English inches, is confirmed by the measurements of the High Sanctuary at Jerusalem, and of the Synagogue in Galilee, given in the recently-published "Tent Work in Palestine." A "cubit of the Sanctuary" of 25·20 in. in length is an entirely imaginary unit of measurement. It would correspond to a human stature of 8 ft. 4·8 in. But the determination of measures of length with any approach to what we now consider to be accuracy, is a matter of very modern date. Even with regard to that most important of ancient measures, the Egyptian cubit, accuracy as to which was of extraordinary moment, as measuring the promised value of the floods of the Nile, those authentic monuments, the Nilometers, show large discrepancies. At Elephantina a Nilometer built into a wall has a cubit of 21 in. Sir Gardner Wilkinson measured another as 21·4 in. Mr. Greaves found a cubit of 21·888 in. The present land derah of 7 palms gives a cubit of 21·847 in., which probably would have been considered by Egyptian metrologists as identical with the measure of Mr. Greaves. Thus there is ample evidence that the scientific, not to say supernatural, accuracy which certain theorists have attributed to the builders of the Pyramids is wholly impossible. In fact, calculations such as are freely supplied for the benefit of the architects of the time of Cheops would have been utterly impossible before the introduction of the Arabic numerals, and the invention of the value of place. We know what the Egyptian numerals were, and that they were even less fitted, if possible, for extended arithmetic operations than even the Roman numerals.

The glances at the history of the English standard units, which Mr. Chisholm attributes to the Saxons, will be read with interest. The relation of some of our measures with Phœnician and Babylonian metrology is a subject as yet comparatively untouched. Thus the queer-looking word "kilderkin," as well as its cognate, "firkin," is distinctly Aramaic; and the barley-corn, our unit of length, is the same. The extraordinary delicacy and care introduced in the determination of our modern standards merit attentive study. Professor Miller found, in 1844, that the previous determinations of the weight of the kilogramme varied among themselves from a minimum of 15432·295 to a maximum of 15438·355 Troy grains. The ultimate result of 166 comparisons, conducted with every conceivable precaution, was the determination of the weight of the *kilogramme des archives* as equal, in a vacuum, to 15432·34874 imperial grains, or 2·20462178 standard platinum pounds. This equivalent has been legalised in this country by the Metric Act of 1864. Mr. Chisholm truly remarks that "as a system of weights and measures constructed on strictly scientific principles, the metric system may fairly claim pre-eminence over all others." We can add our equally unhesitating testimony as to the great practical advantage experienced in its use.

We recommend any of our readers who may feel disturbed as to Egyptian or Chaldean measures or weights to compare such statements as before given as to the Nilometer cubit with the description of the vacuum balance of the Standards Department, figured at p. 173. When, with minds educated to conceive of such possible accuracy as is now attained, we glance back at periods before lenses were in use, before the ratio of expansion of metals was suspected, and before the value of place in arithmetic was known, we may well consider the unit of measurement attributed to King James VI. and I., viz., "the width of the black of my nail," to have been as positive a determination of measure as was required by the metric science but a few centuries ago. Mr. Chisholm's book is one of much interest and value.

* On the Science of Weighing and Measuring, and Standards of Measure and Weight. By H. W. Chisholm, Warden of the Standards. Illustrated. Macmillan, 1877.

THE STAIRCASE-HAND OF THE OLD SCHOOL.

A SKETCH.

STEAM power, rapid communication, international intercourse, machinery, cheap professional literature, journalistic and technical treatises, have worked great changes in recent years in the characteristics of all skilled workmen, but particularly in those of the building trades. The carpenter, joiner, mason, bricklayer, plasterer, painter, &c., of fifty years since was quite unlike his brethren of the above restrictive crafts to-day. In some respects he was a better, as also a more general workman, but his ways and methods were quite primitive and exclusive. Taking the carpenter, for instance, he was a compound operative,—a carpenter and joiner combined,—and, indeed, a cabinet-maker to some extent,—particularly if his practice lay in the provincial towns. The country carpenter was often what was termed a "hedge carpenter" to boot, who, besides executing house-work, was a maker of carts and barrows, and other farming implements, and not seldom a wheelwright and a millwright. The ordinary working carpenter, then, of forty or fifty years ago, was not only good at heavy work, but equally good at light work. As occasions offered, he was a maker of doors and sashes, good at roofing and partition work, handy at trimming and job work,—indeed, ready for any emergency or call, from laying a floor to putting up an ordinary staircase. The professed staircase and handrail hands of fifty years ago, and even much less in London and Dublin, and particularly in the latter city, were a peculiar class of workmen. When they worked at other work apart from staircases they had the choice of the nicest jobs in the workshop or buildings. They were much petted by employers and foremen, and over-praised, and as a consequence, held a very high opinion of their own abilities. Their knowledge of "lines" was greatly exaggerated, and so exclusive were they in their practice that they took care to surround the "setting out" of the plan and elevation of stair and hand-rail with all the mystery that it was possible to bring to bear upon their operations. Some of these operatives of the old school were Solomons and Solons in their way, and their uninitiated adult brethren and apprentices of the workshop, who knew nothing of the mysteries of stair-planning and hand-railing, treated them with great forbearance, if not respect. The staircase-hand of old was a most exacting and dictatorial workman, and ambitious to be an authority on everything in connexion with building. We have before us, in our mind's eye, as we write, a

picture of one of these old worthies, but it matters not to the reader in what particular city or town he once practised his calling, for our sketch will be found a fair reflex of the olden representative in most places. Our old staircase-hands wore spectacles, and they had a peculiar way of looking through them, or over the rims, that made them appear to be studious and wise, and perhaps otherwise. One of the apprentices in the workshop might consider himself greatly honoured if he was permitted to prepare the drawing-board for "setting out" the plan and lines for the staircase and handrail. The board was generally a number of leaves of deal or pine, cleated or clamped together, planed evenly on the top side. When this large drawing-board was ready, the staircase mystery-man either went into an adjoining department, or to a bench at the most distant part of the workshop to commence his "setting-out." His tools or instruments consisted of one or two well-pointed pencils, a large panel, wooden square, and a smaller steel blade square, a bevel, a trammel (sometimes called Price's trammel) for drawing ovals or ellipses, a large pair of compasses, a line or piece of cord, a lump of chalk, a smoothing plane for obliterating wrong tracings or unnecessary markings, a bradawl or two, a sharp chisel for repointing his pencil, a light hammer to drive a brad if occasion needed, and some other odds and ends. With these appliances the mystery-man went to work after due thought and deliberation. Lines wrongly drawn, or which did not please the drawing-master, if not planed out, were chalked out, and many other needful lines were drawn several inches beyond their necessary development and requisite intersections, and made to intersect other lines. This last trick was done to puzzle the uninitiated workman or aspiring apprentice who might be inclined to steal a look at the mystery-man's "lines" when he went to his dinner or to have his beer. The old staircase-hand of the school of Price, Pain, or Nicholson is now nearly an extinct genus. He put up his treads and risers, step by step, levelling each as he ascended, for his sleepers or carriage-pieces were fixed before hand. It would have been rank heresy to ask your old staircase-hand some years ago to prepare his string-boards, and put together his flights of stairs in the workshop. He did not dream of such innovation as making stairs like step-ladders in the workshop, and carrying them to the building to be "run up" in their places. He loved his story-rod, on which were marked the number of steps, and with his favourite rod he built up riser and tread accordingly from landing to landing, and from story to story, from basement to attic. Your old staircase-hand was more partial to wall skirting being scribed down to his steps than having a wall or inner string-board. The old staircase-hand was, in the true acceptation of the term, a regular stair-builder, building up step by step, and strengthening his work as he proceeded. But we must not enter into too many details for fear of raising the ghost of the departed.

In handrailing, our old staircase-hand was a mighty personage, whether in dog-legged stairs, stairs with newel posts, single or double, or with well-holes. His ramps and swan-necks were marvellous in their curves and sweeps, and his huge scrolls and twists at a later date were miraculous,—so he thought, and so did others of his surprised brethren, who began soon to feel an upheaving and a strange unrest, as if the good old times were drawing to their end. Give him his due, the old staircase-hand was, as far as his light allowed him, an honest, sound, and conscientious workman. Were he alive to-day, though, he would undoubtedly witness good staircase-builders in Great Britain, yet their manner of planning and working would give him a fit of epilepsy that he would never get over. He would be sure to witness, at the same time, hundreds of creaking, break-neck step-ladders, miscalled stairs, and handrails the thickness of walking-sticks, undulating up and down like the waves of the ocean. Every carpenter and joiner will tell you now he is a staircase and handrail hand, though we know thousands are not: they ought to be. There is no longer any mystery in the art; all that is needed on the part of the young workman is a little studious attention to master a few simple geometrical principles, and no carpenter, joiner, or mason should rest satisfied until he is able to "set out" and "put up" staircases and handrails of all ordinary forms, and in all situations.

The dear old methods of the handrailers long tenaciously clung to and worshipped have vanished, except in odd and out-of-the-way places. Several sacred templates and falling-moulds are dashed to pieces, improved cradling and cylindrical forms, for trying sections of the curved portions of the handrail upon, to see whether it had its proper pitch and curves, are abolished. "Springing the plank," or glueing up the rail in several thicknesses, is exploded, or little practised; the step-mould and face-mould, with a centre line and a proper squaring, are all-sufficient with the needful cutlery tools, and the skill for using them well.

The literature of staircase building and handrailing has greatly expanded within recent years, and some useful British and American treatises have been published, but, like the Round Tower disputants of Ireland, some of our handrail instructors have puzzled themselves in striving to inform others. Desperate efforts have been made by some innovators of late years to save a little material in getting out the wreath and other curved portions of the handrails. It is certainly wise to save valuable material by practical methods of construction, so long as durability and graceful proportions are not sacrificed to cheeseparing economy, but as our subject is with the characteristics of the staircase-hand of the old school, we will conclude here, leaving the surroundings of the practitioner of the new school for treatment on a future occasion if necessary.

THE DOME OF THE ROCK.

SIR,—As Lieutenant Conder writes temperately, and in his own name, it would give me pleasure to answer in detail the statements he makes in his letter which appeared in your last issue, were it possible to do this without an expenditure of space and labour wholly incommensurate with their importance. It requires only a few lines to make an assertion, especially when there is no attempt made to support it by evidence, but a great many may be necessary to disprove it to the satisfaction of others, and, in this case, without numerous illustrations it would be impossible to make the argument intelligible. So far as I am capable of forming an opinion, all Lieutenant Conder's statements are based on imperfect or erroneous views of the architecture or archæology of the age he is treating of. But without going into the whole history of these sciences at that time his assertions cannot be refuted, while a simple denial leaves the question exactly where it was, dependent on the relative credibility of the assertors.

There is, however, one statement, with which he sums up all that runs through the argumentative part of his letter, so important in itself, and which touches so nearly the marrow of my argument, that to leave it unnoticed would be to confess it unanswerable. It is contained in the following paragraph (p. 668):—"If, then, the Golden Gateway was Constantine's work, how comes it that he used semicircular arches there, but pointed arches in the Dome of the Rock, while Justinian reverts to the semicircular arch? On the other hand, in the mosque of Amru, at Cairo, which, as before noticed, was rebuilt by 'Abd el Melik, we find the arches to have just the slightest approach to a point (as described by Coste in his 'Architecture Arabe'), resembling those of the Dome of the Rock."

My answer to this is, that there are no pointed arches, properly so called, in the Dome of the Rock.

To begin with the central pier-arches under the dome, which are the only ones about which there is any doubt, I have before me Arundale's original drawing, from which the section (plate vi. of my "Temples of the Jews") was engraved. The arches there are all circular, and struck from one compass hole, which is still remaining. In De Vogüé's section (plate xix., "Le Temple de Jérusalem") they do seem as if struck from two centres, but they have a key-stone, and the scale is unfortunately so small that it is difficult to say what was intended. From personal inspection on the spot, I can assert that the deviation from a true circle is so slight that it cannot be detected by the naked eye. My impression is that it is struck from three centres, and is, in fact, a stilted ellipse, like the arch of the Ecce Homo, which is certainly anterior to Constantine's time,—probably Aurelian's. Be this as it may, nothing would surprise me less than that these pier-arches should be of any shape. Assuming them to be of Constantine's time, it was the first attempt to carry a tall drum and dome on arches springing from the capitals of Corinthian columns, and in a country where the eye had long been familiar with the forms of pointed arches, though of horizontal construction,* the wonder rather is, that they did not boldly adopt that form, instead of so concealing it that it can hardly be detected even in a photograph.

Passing from these constructive arches of the great Dome, there is, fortunately, no doubt or hesitation with regard to all the other arches or openings in the Dome of the Rock; they are absolutely and unmistakably circular. Those of the intermediate arcade were measured and published by De Vogüé on a sufficient scale (plate xxi. of "Le Temple de Jérusalem") to leave no doubt as to their form, and in this he is confirmed by Arundale, and by photographs. We also know, for certain, from M. Le Comte's drawings, published by M. Ganneau (Quarterly Report, P. E. F., 1874, pp. 154, 155, and reproduced in my "Temples of the Jews," as woodcuts 49, 50), and from photographs, that all the external openings of the building, and all the arcades, are, without exception, circular-headed. In fact, in all its architectural features, the Dome of the Rock is as essentially the product of a round-arched style as any Classical building, and, in some respects, even more distinctly so than the Golden Gateway.

From what he says of it, I presume Lieut. Conder never saw the Mosque of Amru at Cairo; or, at all events, if he did, it was after its restoration, which has as entirely destroyed it as an historical monument as any of our churches after undergoing that process, and he consequently is dependent on M. Coste's most fallacious and incorrect restoration for his knowledge of it. Fortunately I saw it in 1839, before the mischief was done, and can confirm the accuracy of M. Girault de Prangey's far more detailed and accurate drawings ("Monuments Arabes," plates 4 and 5); but the story they tell is very different from that of Coste. From these drawings we learn that all the arches of the old parts, presumably of the original Mosque, resting on the Classical pillars, are unmistakeably circular. That the tie-rod between the capitals has no similarity to that of the Dome of the Rock, while all the openings in that part ascribed to 'Abd el Melik, are as clearly and distinctly pointed as the Arches of the Aksa at Jerusalem.† In short, if the restorers of the Amru, or the builders of the Aksa, had anything to do with the building of the Dome of the Rock, I hold it to be impossible that the pointed arch should not appear in its decorative and external features, which it does not. I can consequently only repeat my settled conviction,—for reasons I cannot recapitulate here, though they are all stated elsewhere,—that centuries elapsed between the building of the Dome of the Rock and the erection of the Aksa, but years only between the building of the Dome and the Golden Gateway.

I need hardly say there are several things in Lieut. Conder's letter regarding which my fingers itch to write a few lines. But I refrain: one thing at a time. The principal point of public interest in it, is this question of the pointed arches; the others are more or less personal; and when that is settled we may revert to the others,—if it is worth while. Meanwhile, what I would ask of Lieut. Conder is, that he should produce a drawing to scale, of one at least, of the pointed arches of the Dome of the Rock. He is an Engineer officer, and can both measure and draw. He was on the scaffold when it was up; "walked on the beam"; and has, doubtless, a sufficient number of notes and sketches to do this. If he would add a drawing of the pointed arches of the Aksa as a means of comparison, it would be useful. There would be no difficulty in getting them engraved. They may be as simple as possible, provided their outline is accurate. When we get these we shall know what we are about. So far as I know, no such drawings at present exist, and till they do, the public at least have not sufficient data before them from which to form a definite opinion regarding this most interesting question.

JAS. FERGUSSON.

* The gateway at Assos is a striking example of this, as drawn by Texier in his "Asie Mineure," and reproduced in my "History of Architecture," vol. i., p. 238, with several other examples.

† A portion of these were reproduced by me in a woodcut in my "History of Architecture," vol. ii., p. 509, woodcut 960.

THE LAND SURVEYORS' CLUB IN STAFFORDSHIRE.

THE annual summer outing of this Club took place last week, Staffordshire being the *locale*.

Most of the members and their friends arrived at Stafford on Tuesday evening. On Wednesday morning they left Stafford by rail at 9·15, proceeding to Rugeley (Trent Valley) Station, where they were joined by Mr. Bolam, Mr. H. L. Smith (solicitor to the Ingestre Trustees), and Mr. B. Tower. The party now included Mr. John Clutton (London), the senior member of the club; Mr. R. C. Driver (London), the hon. secretary and treasurer; Mr. V. Buckland (London), secretary to the Surveyors' Association; Mr. Penfold, secretary to the Institution of Surveyors; the Hon. A. L. Pelham; Col. Lane; Mr. E. Foden, agent to Lord Hatherton; Mr. Darling, agent to the Marquis of Anglesey; Mr. E. Turner, agent to Lord Zouche; Mr. Snowball, agent to the Duke of Northumberland; Mr. W. L. Dodgson, agent to Lord Boyne; Mr. F. F. Fox, &c., in all about fifty persons. From the Trent Valley Junction the Rugeley Town Station was soon gained. Here the party alighted, and after walking up the line for a short distance found awaiting them a colliery train to convey them to the Earl of Shrewsbury's pits at Brereton. This point of destination was soon reached, the party alighting at the Coppice Pit, so-called from the picturesque background which renders this pit unique, the foliage of a beautifully-wooded slope reaching almost to the mouth of the shaft. Here the party were joined by Mr. Robinson, the general manager at the colliery. From the Coppice Pit the visitors proceeded to Belfast Pit, and thence to the Brickkiln Pits of the Hayes Colliery. Here luncheon was partaken of underground, and the "upper crust" having been once more regained, the visitors took to the carriages which were in readiness to convey them by way of Rugeley and Shugborough Park to Ingestre, and thence to Stafford. *En route* they saw the colliery farm, which has recently been reclaimed from the Chase, and were assured that after a few years' cultivation it will have become excellent land. Wheat and potatoes were seen upon one side of the road; on the other was the native heather and gorse of the Chase. Soon Rugeley was reached, after which the visitors drove along the pretty bit of road that leads thence to Shugborough, between hedge-rows laden white with wild roses and the bloom of the elder-trees. After passing the gates of Shugborough Park, the first stroke of ill-luck befel the party. A thunder-shower compelled them to leave the carriages and seek the best shelter that could be found, and with some intermissions the rain continued till Ingestre was reached. Here the visitors were hospitably entertained by Mr. Bolam, at his house. An opportunity was also afforded of inspecting the raft-yard and workshops which are here. Every variety of joinery required upon the Shrewsbury estate is done at the workshops, which are under the direction of Mr. Pickering. The visitors were shown how an entire gate could be constructed in a very few minutes. Besides windows, doors, &c., there were also in course of construction the seats of a church and desks for the village school. Ingestre Hall having been visited, a pleasant drive through Ingestre Park brought the party in sight of Stafford, which was reached safely shortly before seven o'clock.

In the evening a dinner took place at the North-Western Hotel, Mr. John Clutton in the chair.

Mr. T. Huskinson, in proposing the health of the Earl of Shrewsbury, remarked that it had been the good fortune of the Club to have the opportunity of inspecting some of the principal seats in England, beginning with the Royal domain at Windsor, and though they had a very pleasant recollection of many of those places, they had to say that they had seen something that day of a distinctive character from what they had seen before, in having not only witnessed what was upon, but what was under the earth. Referring to the question of small or large properties and occupations, he said that the experience of successive years confirmed him in the belief that to the large properties and the large occupations of this country are mainly owing the position which English farming enjoys. That was his opinion, notwithstanding what might be said by philosophers and economists about the advantages of small properties and small occupations, which he did not believe were the factors from which useful results could be expected. On behalf of the club he thanked Lord Shrewsbury for affording them the pleasure and instruction they had all enjoyed that day in inspecting his estates.

On Thursday morning the visitors proceeded by rail to Uttoxeter, whence carriages were taken to Alton Towers, passing on the way Crakemarsh Hall, Woodseat, the residence of Mr. C. M. Campbell, M.P., skirting Rocester, and so on to the pretty village of Denstone, soon after passing which the entrance to the drive leading to the Towers was descried. Upon reaching the Towers, the visitors received a cordial welcome from Lord Shrewsbury, who entertained them at luncheon.

Soon afterwards the party left for Alton railway station, and before long were *en route* to the various places of their destination. A long and interesting report of the proceedings appeared in the *Staffordshire Advertiser*, to which we are indebted.

OBITUARY.

Mr. Arthur Wallis Colling, the clerk of the works at the new Law Courts, under Mr. G. E. Street, died on the 24th of June, after a short illness, in his 61st year, having held the office for eight years and a half. Mr. A. W. Colling, who was the brother of Mr. James K. Colling, architect, was noted, among those that knew him, for his knowledge of practical building, and was highly esteemed in that respect. He commenced his career many years ago as a clerk of works for several buildings under the late Sir Gilbert Scott, when that gentleman was in partnership with Mr. Moffatt. He afterwards was for several years in the employ of Messrs. Peto & Betts, and wholly superintended and carried out for them very extensive building works on the Great Eastern Railway, as well as, subsequently, others of a similar character on the loop-line through Lincolnshire of the Great Northern Railway. Having left their service at the termination of these works, he became engaged under the late Mr. William Burn, architect, and remained in his service until that gentleman died. Among many other works that he superintended while under Mr. Burn were some very important alterations and additions to Holkham Hall for the Earl of Leicester, and the erection of Montagu House, Whitehall, for the Duke of Buccleuch. At the termination of this large and somewhat difficult work he passed into the service of Mr. Street, as already mentioned.

Mr. H. W. F. Bolckow, the chief founder of the great iron industry of Middlesbrough, and its first mayor and member, died on the 18th ult. Mr. Bolckow was a German by birth. Thirty-six years ago he started in the iron trade, and was at his death the chairman of the colossal iron and coal company of Bolckow, Vaughan, & Company (Limited). Mr. Bolckow gave a public park to the town, which he represented in the Liberal interest. He was in his 72nd year.

Mr. Charles Mathews, the celebrated comedian, who died last week at Manchester, and was buried on Saturday at Kensal Green, was at one time identified with the architectural profession. His father had intended to make a parson of him, but Charles demurred, not being conscious of any strong vocation for the pulpit. "By way of compromise," as he used himself to say, it was arranged that he should become an architect, in which capacity he would have "something to do both with churches and theatres." He was accordingly articled to Mr. Pugin, from whose office he afterwards passed into that of Mr. Nash. In 1823, when in Italy with the Blessingtons, he made the acquaintance of Count Alfred d'Orsay, who expressed dissatisfaction that the young Englishman, who in the ostensible pursuit of architectural study had brought with him "so many sketch-books," should have made "so few drawings." After a while, on his return to London, he obtained an appointment as architect to a mining company in Wales, where he found abundance of work in the way of superintending the construction of storehouses, tramways, &c. In 1827 he went back to Italy on a professional tour in company with Mr. James D'Eville, the water-colour painter, with whom he had been associated in Augustus Pugin's office. They visited together Milan, Rome, and Venice, making drawings of the more important buildings, and contracting many pleasant friendships. These three cities elected Mathews a member of their several academies, and at Rome some of his drawings of the Duomo d'Ossola were exhibited. In 1832 he applied for and obtained the appointment of district surveyor for Bow and Bethnal-green,—a singular position for a man of Charles Mathews's cast of mind. He would seem to have held the appointment for about two years, when, awakening to the fact that architecture was "slow," he took to the study and practice of oil-painting, and with such success that a picture of his, "The Lake of Perugia," was exhibited at the Royal Academy, Somerset House, in 1835. In midsummer of that year he became, in consequence of the death of his father, part proprietor of the Adelphi Theatre, but after a few months' experience of the sweets of management he sold his share to Messrs. Ephraim Bond & Co., resolved to try his fortune as an actor, and disappeared from the architectural profession.

Colonel Cameron, R.E., C.B., director-general of the Ordnance Survey, died on Monday at Southampton after a short illness.

SCHOOL OF FINE ARTS, PARIS.

WE have just assisted at the banquet of the old pupils of the School of Fine Arts, at which not only most of the architects of Paris were present, but also a great number of former students of the École des Beaux Arts arrived from all parts of Europe. An English architect, Mr. Laurence Harvey, proposed a toast in the name of the foreign pupils, in which he thanked the French nation for the hospitality which this Art School affords to all foreigners. Considering that the high training given here is gratuitous, the school being maintained by public money, we feel sure many English artists who have been wholly or partly taught in Paris will be pleased to read *in extenso* what was said in their name. We give it in English:—

"The École des Beaux Arts is an Alma Mater whose fostering care is ever cherished by her grateful sons. No wonder if, responding to your kind invitation, I have hurried from London to tell you so; indeed, I only express the feelings of every travelled foreigner when I own that France stands alone for the earnestness of her artistic efforts, and the liberality with which she invites the world to share in her art-treasures. In France, art is not shoppy and self-seeking, but wooes the world for leave to do it good. And so the world loves France,—weeps when she weeps, and rejoices when she rejoices.

I now speak as an Englishman who has spent much of his time in Switzerland, Germany, and Italy. Everywhere have I met old *élèves* spreading the fame of the "École," and helping one another, in remembrance of the good days of yore.

Gentlemen, in the name of the foreign pupils of the École des Beaux Arts, I beg you to join me in drinking to the prosperity of France, and to that of her noble School of Arts."

THE GREAT CROSBY SCHOOLS.

THE Great Crosby Schools of the Merchant Taylors' Company are situated on ten acres of land upon the high road from Liverpool to Southport, and are built on the higher part of the ground, which slopes gradually to the south.

Close to the entrance-gates is the lodge; the schools occupy the central part, and the master's residence and garden the western extremity of the ground.

Over the principal entrance to the schools is a tower, 16 ft. square and 90 ft. high, containing in the upper part a chamber for clock and bell. The clock-face, 5 ft. 3 in. diameter, will be illuminated. The gable over the entrance itself is ornamented with carving, and the centre panel contains the arms of the Merchant Taylors' Company.

On the right of the tower is a hat and cloak room for boys, and a corridor leads to two class-rooms, 25 ft. by 20 ft., and to the large school-room, 60 ft. by 30 ft. To the left of the tower is a porter's room, storeroom, two class-rooms, 25 ft. by 20 ft.; and the western wing is occupied by the master's library, 30 ft. by 20 ft. A natural science lecture-room, 34 ft. by 25 ft., with a laboratory attached, 33 ft. by 10 ft. A staircase gives access to the kitchen on the upper story, and a large dining-room, 34 ft. by 34 ft., for the use of the boys who reside at a distance.

The style of architecture is Mediæval, executed in red brickwork, with dressings and ornaments of Stourton stone. The roofs are covered with banded green Westmoreland slates. The large school-room has an open timber roof of ornamental character. The circular tracery window at the north end, and the upper part of the bay window at the south end of this room, are filled with stained glass.

The building is to accommodate 250 boys, and is arranged for enlargement to receive 400.

The grounds are planted with a large variety of trees and shrubs, and are prepared for two cricket-grounds, fives-courts, &c. The cost of the whole will be about 17,000*l.* The architects are Messrs. Lockwood & Mawson. The principal contractor, Mr. S. Webster. The heating apparatus has been supplied by Mr. W. W. Phipson, London; and the whole of the school-fittings by Mr. G. M. Hammer. Mr. W. R. Bennett was the clerk of works.

THE WEST MARINA ESPLANADE, ST. LEONARD'S-ON-SEA.

As already briefly mentioned in the *Builder* (p. 632, *ante*), the West Marina Esplanade has been opened with much rejoicing.

During the half century of its existence,* St. Leonard's, or "the New Town," as it was formerly called, to distinguish it from Hastings, has rapidly grown, and has become united with the older place for municipal and other purposes, so that now Hastings and St. Leonard's have become one large borough. With their extended area, the corporation of Hastings have very commendably begun to carry out public improvements in the western part of their district. By far the most important of those improvements is the new parade and sea wall at West Marina, where some of the finest mansions of the borough have been built. This new parade is nearly 2,000 ft. in length, with an average width of 50 ft., the old parade, which it has superseded, being only 20 ft. in width. The wall on the sea side is 15 ft. in thickness at the foundation, and the parade is raised above the road at the western end about 5 ft. The work has been carried out by Mr. Jenkins, the amount of whose contract was 10,500*l.* In addition to the parade, seven new groynes have been constructed, at a cost of 2,600*l.*, this portion of the work being carried out by Mr. F. Winser.

The proceedings began with a luncheon at 105, Marina, the residence of the Rev. J. A. and Mrs. Hatchard, by whom the mayor and corporation, and other influential residents and visitors, were hospitably entertained. Some twelve years ago, when the control of the parade was in the hands of the commissioners, Mr. Hatchard, as one of that body, advocated the carrying out of an improvement similar to that which has now taken place.

SOCIAL SCIENCE CONGRESS.

THE following are the special questions selected for discussion in the Health Department at the forthcoming Social Science Congress at Cheltenham:—

1. The importance of complete disinfection, and the best means of providing for it by sanitary authorities.
2. On the better regulation of house building generally, and the best mode of improving the sanitary condition of existing houses.
3. How best to overcome the difficulties of overcrowding amongst the necessitous classes?

In addition to the above, papers volunteered on other subjects will be read and discussed.

Tin-plate and Wire-work Exhibition.—At the Crystal Palace, on Saturday last, Lord Carnarvon opened an exhibition of tin and wire work, which, with the object of encouraging good workmanship, has been organised by the Tin-plate Workers and Wire Workers' Company, an old City guild. Prizes were offered for competition to workmen, and although some firms are among the exhibitors, the prizes will be taken by the workmen engaged on the articles exhibited. The exhibition is held in the Bohemian Court, and includes articles both ornamental and useful. The Tin-plate Decorating Company, of Neath, South Wales, send specimens of iron and tin to show the various stages through which the metals go before the tin-plate is produced. Mr. F. W. Potter, Hill-street, Finsbury, exhibits samples of woven wire gauze for water-marking paper. One specimen of wire gauze has many thousands of meshes to the square inch. Mrs. Amelia Lewis, of Oldham, sends some improved cooking utensils, &c. The exhibition will remain open for some time.

* It was founded by Mr. James Burton, architect, and celebrated its jubilee in the early part of this year (see p. 330, *ante*).

ATLAS ELECTRO-PLATING WORKS,

PARADISE-STREET, BIRMINGHAM.

THIS block of buildings, the principal front of which is represented in our illustration, has recently been erected for Messrs. Horace Woodward & Co., at a cost, including machinery, of 25,000*l.* The width of the frontage is 58 ft., and the buildings extend from Paradise-street to Edmund-street, a depth of 200 ft. The elevation to Paradise-street forms one of the most conspicuous of recent additions to the street architecture of Birmingham. It is constructed of Ancaster stone and red brick. The most prominent feature is a large central oriel window, two stories in height, terminating in a dormer. At the springing of corbelling for the oriel, and over the keystone of the principal entrance, is a figure of "Atlas."

Red and yellow terra cotta have been made use of in the tympana of the dormers, in the consoles and panels of the principal cornice and other portions. The panels above the central archway are filled in with discs of green terra cotta, and bosses of red polished granite are introduced above the semicircular window-arches.

The central entrance leads directly into Messrs. Woodward's show-rooms, the first of which is oblong in plan, 32 ft. by 14 ft. 6 in. The inner or principal show-room is octagonal on plan, and 40 ft. in diameter. In the angles of the octagon are black marble shafts, with stone bases and foliated capitals; from these capitals spring consoles carrying the cornice, and on the face of the consoles are small ornamental pendentive arches, by which the transition from the octagonal plan of the room to the circular lines of the cornice and ceiling is effected agreeably. The ceiling is elliptical in section, with enriched bands and panels, and has a central light.

The two side entrances give access to the front rooms, which are let as shops, and to staircases leading to the front rooms on first and second floors, which are let as offices.

Messrs. Woodward & Co.'s own offices also occupy part of the front buildings; and in the extensive premises farther back, accommodation is provided for their whole establishment, with workshops and rooms for casting, plating, gilding, stamping, modelling, and burnishing.

The elevation to Edmund-street is four stories in height, of plainer character than the one illustrated. The entrance-gateway to the workshops is in this front, and the boilers and engine are placed at this end of the building. The engine-stack is 110 ft. in height, and is very conspicuous on entering the town by Broad-street. It is square on plan, with moulded brick bands and cornice.

The buildings are provided with machinery adapted to the various processes carried on, and with all recent improvements; and altogether they present one of the foremost examples of the newer type of Birmingham manufactory.

The architect is Mr. Yeoville Thomason. The builders are Messrs. William Parker & Sons.

NEW COURT, LINCOLN'S INN.

THE new building, now on the point of completion (indeed, already partly occupied) which we illustrate this week, forms the first portion of what will probably become the favourite legal quarter of London. It occupies a site on the northern side of Carey-street, immediately opposite the New Law Courts, and close to that entrance of the courts which will be chiefly used by members of the legal profession.

New Court is the property of the Serle-street and Cook's-court Improvement Company, and will eventually occupy the entire block bounded by the two arms of Carey-street on the south and west, by Serle-street on the east, and by Portugal-street on the north, embracing an area of about 5,500 yards. The chambers will surround this site, and consist of twelve distinct houses, each having its entrance, its staircases, and its conveniences complete and self-contained. The entrances to the chambers, as in other legal quarters, will all be from the interior of the quadrangle,—a spacious square of about 1,600 yards, the centre of which will be planted as a garden, ensuring light and quiet to the chambers looking into it.

The south side of the court, which faces the New Law Courts, has been set back so as to give a largely-increased width to Carey-street. This, will be of very great value to the public, and it is to be hoped that the improvement of Carey-street will before long be completed by clearing away the unsightly buildings attached to the south side of New Square, and throwing the ground which they occupy into the street.

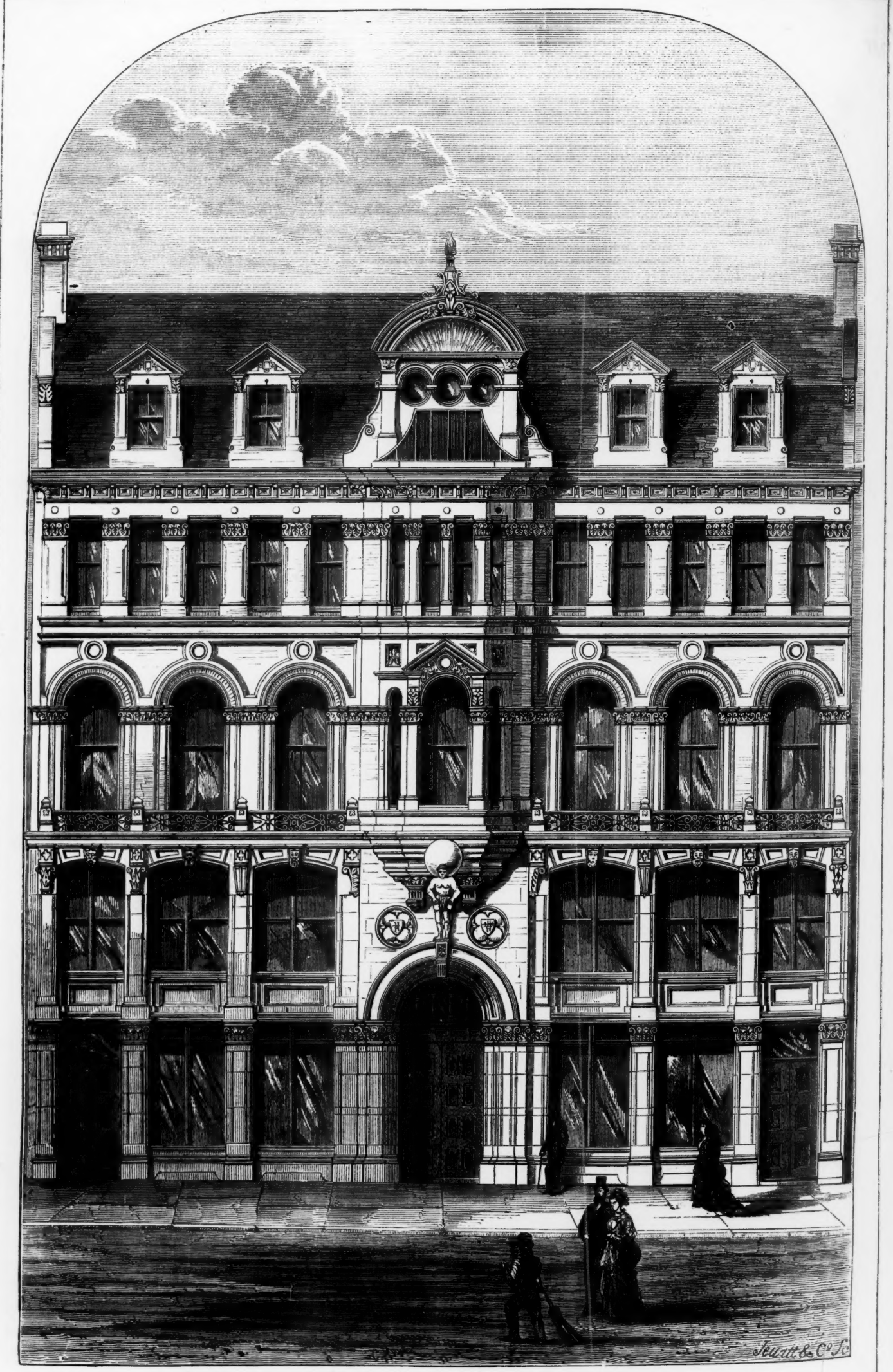
It is intended to limit the use of the New Court to members of the legal profession, or to such as may be in some way connected therewith. Adjoining the entrance-archway (which is immediately opposite the entrance to the New Law Courts), spacious premises have been prepared for the National Provincial Bank, who have a porch-entrance from Carey-street. At the south-western corner a similar porch opens into similar premises, and these are the only two entrances which the New Court will have from the surrounding streets, save the main archway at the south-east corner. The appropriation of the different floors scarcely needs description. The chambers are so arranged as to be conveniently occupied in suites varying from two to ten rooms. Each suite will have its own fire-proof safe, in many cases two, within its own walls, and as such accommodation is peculiarly requisite for gentlemen of the law, a sub-basement, honeycombed with substantial firebrick safes, has been constructed under the greater portion of the building. Water-closets are excluded from the houses, except from the top-most floor, all such conveniences being provided under the pavements of the surounding streets, lighted and ventilated from the open areas. The exterior of the building is constructed of red brick and red terra-cotta, stone being entirely avoided. The masses of the structure are severely simple towards the surrounding streets, richness of detail being confined to such parts as the entrance-archway and tower, the cornice and parapet, and the string-courses.* The obtuse angle at the south-west corner is accentuated by a corbelled and gabled projection, forming the second prominent feature of that portion of New Court already built. Stone has also been avoided internally, the staircases being of iron, to which an artistic character has been given, with Hawksley's treads inserted so as to be easily renewable.

The general contractors are Messrs. Perry & Co. The terra cotta for all the parts below the cornice was supplied by the Watcombe Company; and that for the cornice itself and parts above, by the Architectural Terra-Cotta Company, of Mile-end, whose raw material was the London clay, used, like the Watcombe clay, without any colouring material whatever. The iron columns in one bank are encased with Watcombe terra-cotta, and those in the other with Della-Robbia ware, by Messrs. Gibbs & Canning, of Tamworth. The iron staircases and all ornamental metal-work have been supplied by Messrs. Hart, Son, Peard, & Co.; and the 200 strong-room doors to a special specification, by Messrs. Hobbs, Hart, & Co. Mr. Boyd's hygeistic grates are fixed in all the larger rooms, and almost every fireplace is made cheerful by tiled hearth and cheeks.

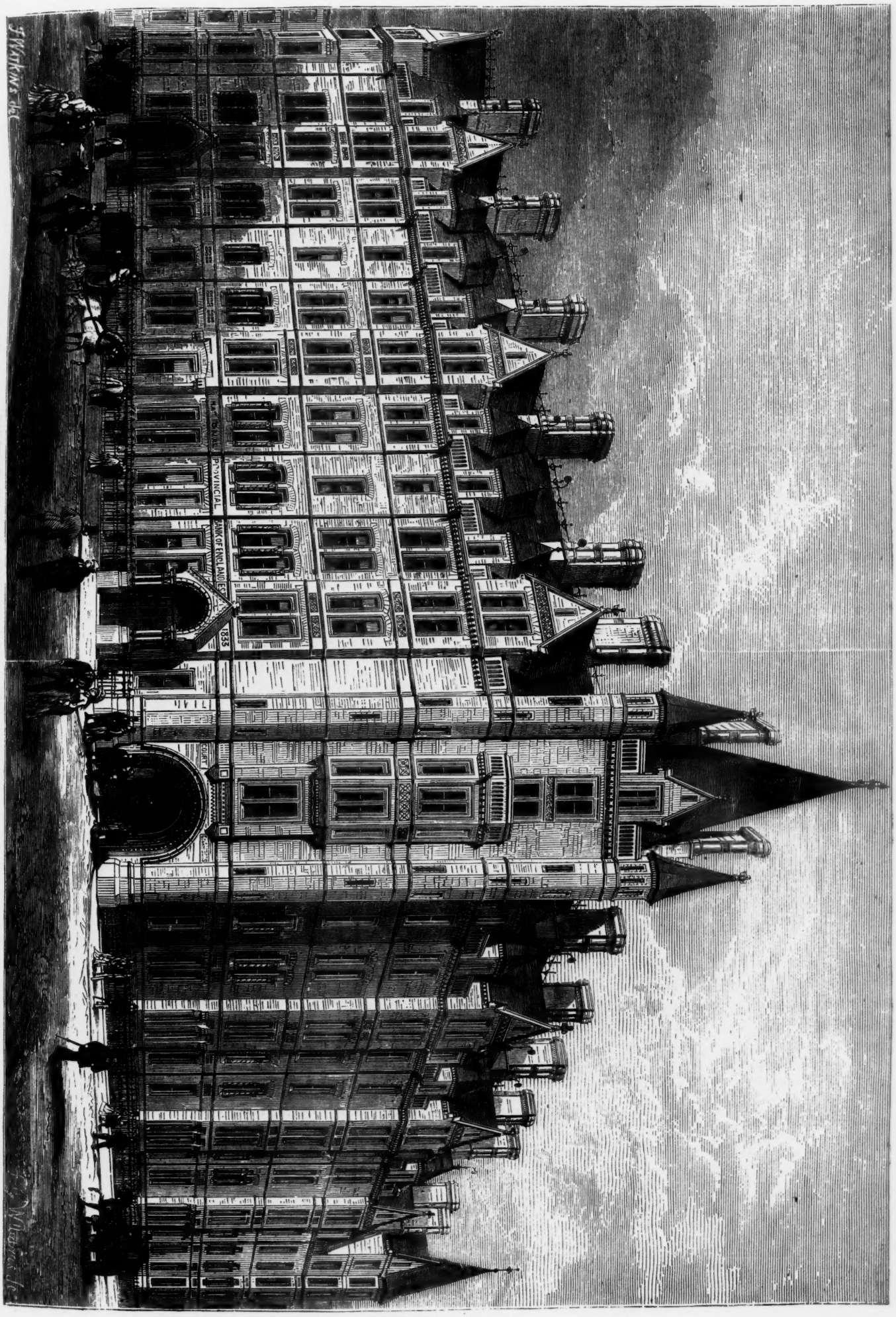
Mr. Waterhouse, A.R.A., is the architect, and Mr. W. McGill, the clerk of the works.

Discreditable Scene at a Fire.—On Wednesday morning in last week a fire broke out in the centre of the market town of Potton, Bedfordshire. It originated in a barn in the occupation of Mr. David Abbott, market gardener. An alarm was at once raised, and a fire-engine was quickly on the spot. This was taken into the yard of Mr. John Fane, butcher, the hose was connected, and a dam placed under the pump, but it is stated that just as the men were beginning to play on the building, the use of the water was refused, so that the Brigade were utterly powerless. The consequence was that the fire rapidly spread, many of the buildings in the vicinity being of wood, and thatch-roofed. The number of houses destroyed was twenty-two, mostly inhabited by poor people, who had not insured their furniture. Besides these houses, a great many outbuildings were destroyed, the fire having extended over three acres of ground. The *Bedfordshire Times* says,—"Undoubtedly all this loss and suffering resulted from the action of Mr. Fane in withholding water at the beginning, and, as might be supposed, the indignation felt by the poor people was very strong."

* Towards the quadrangle the numerous doorways, staircase windows, dormers, and other features, contribute to more picturesqueness of treatment than was practicable with the external elevations.



STREET ARCHITECTURE, BIRMINGHAM: THE ATLAS ELECTRO-PLATING WORKS.
MR. YEOVILLE THOMASON, ARCHITECT.



NEW COURT, LINCOLN'S-INN.—MR. WATERHOUSE, A.R.A., ARCHITECT.

DOMESTIC ECONOMY CONGRESS, MANCHESTER.

THE second Annual Congress on Domestic Economy, held under the auspices of the Society of Arts, was opened in Manchester on the evening of the 26th ult., by a *conversazione* in the Town-hall.

The Mayor (Alderman Grundy) having welcomed the Congress to Manchester,

The Duke of Westminster returned thanks on behalf of the Society of Arts, and said that it seemed to him right and fitting that as the congress was held last year in the important town of Birmingham, it should be held this year in the great centre of the cotton industry. In conclusion, he read a letter from the Prince of Wales, who wrote:—

"As president of the Society of Arts, I request your Grace to have the kindness to express to the Mayor and Corporation of Manchester my thanks for the great and cordial assistance they have afforded to the Society of Arts in holding the congress for discussing domestic economy and elementary education in the city of Manchester in connexion with the educational institutions in Cheshire and Lancashire. The knowledge of domestic economy is a knowledge of all that makes home life moral and happy, and is at the root of the education of every young child. I rejoice that the subject has been connected with the public elementary education of the country."

The first meeting for the reading and discussion of papers was held on the 27th ult., when the Duke of Westminster, in a brief introductory address, said that there were two main difficulties in the way of congresses of this kind. The first difficulty was to obtain teachers, and the second those who were to be taught. No doubt the sense of the congress would be that the education of girls was the subject which ought to be sought for in the main, while the boys should not be neglected in these respects, for, as they all knew, on the female head of the house depended its management, so that it was upon them that the main responsibility rested. All of them knew something of the condition of the homes of the working classes both in town and country. They were equally bad, he was afraid, in the country as in the towns, but worst in the most crowded parts of great towns, though there were houses well kept, where order and method and cleanliness, and, as a consequence, health and happiness reigned, which formed a striking contrast to the ill-kept, miserable, and untidy homes of the great majority of the working classes. There was one other subject upon which he might enter—the connexion of intemperance with the question of these ill-kept homes,—how they acted and reacted one upon another. What was distressing in the case of Manchester was that the statistics showed that, while intemperance among the men was certainly decreasing, intemperance among women was increasing very considerably. That was the case in some parts of England, but especially in Scotland; and in Ireland he was afraid they were not much better. That was an unfortunate state of things, which required their very anxious consideration. It was bad enough when the bread-winner of the house took to drink, but he thought the congress would agree with him that it was worse when the female head of the house, and the manager of the household, who had to bring up the family, took to it. God help them in such a case, for no other help could possibly avail. He often wondered that more notice was not taken of the slatternly and untidy way in which the managers in so many English homes carried on their household duties. He urged the necessity of a regular system of education in cookery being given to girls, and said another reason why the congress was fittingly held in Manchester was that the death-rate of the city and of Liverpool was increasing. The work of the congress was one of great philanthropy, which concerned the happiness not only of thousands in this country, but of a still larger circle.

The Rev. E. F. M. M'Carthy submitted a short report, embodying the general views expressed at the Birmingham Conference of last year, and the reading of papers was then proceeded with.

Sir Henry Cole read a paper urging the expediency of establishing "national colleges" of domestic economy. He advocated the introduction of the teaching of domestic economy into public elementary schools as of the first importance to the future well-being of the people. It could not be expected, he said, that advanced instruction could be given in these subjects of domestic economy in primary schools, but elementary instructions might be given even in infant schools, and the first principles underlying all the subjects, such as those of cleanliness, neatness, order, method, carefulness, and the use of the hands, could be taught to all children of both sexes, and elementary teachers could be made to practise them. The elements might be laid in elementary schools, but it would be in secondary schools and night classes that the development of them would be found. Special teachers must be trained to give suitable lectures and demonstrations in large elementary schools to the advanced children only, and such teachers should be trained on principles analogous to those successfully carried out for teaching science and art throughout the country. State aid was quite as necessary, and perhaps more so, for domestic economy, as for any of the twenty-three subjects of science and art now aided by the State, and he suggested that her Majesty's Commissioners should endow such a college out of the surplus funds of the Exhibition of 1851. In a second paper, Sir Henry Cole pointed out the desirability of making Chetham Hospital a school of this character, and expressed a hope that the trustees might be induced to make it the first school of its class in the country.

The Dean of Manchester condemned the idea of establishing another training college, and said he did not see why in the colleges at present in existence such portions of domestic economy as were necessary to be taught should not be added to the curriculum. As to the teachers, they would be found in the very colleges where the science was taught. He had heard of a girl being asked to write an essay on the best way of making a bed. Some might think the thing right, but to him it seemed to be nonsense.

Dr. Vaughan (Roman Catholic Bishop of Salford) was very much inclined to agree with the Dean of Manchester. It would, he thought, be time to establish training colleges for this particular purpose when all other means of imparting education had failed.

On the subject of "Thrift in Schools," Mr. G. C. T. Bartley read a paper. He urged that thrift should be regarded as the habit of making the utmost and best use, not only of money, but of materials and time. It could not be taught like an abstract subject, but must be constantly exemplified and practically illustrated during school life. In a direct way thrift might be promoted by the establishment of penny banks in schools, by teaching children the meaning of insurance, and the giving up of something in the present in order to secure something better in the future. This might be done by anecdotes introduced into lessons of arithmetic. Teachers should endeavour, whenever possible, even in other subjects of instruction, to inculcate habits of thrift by example, homely illustration, and simple precepts. The great effect of thrift on temperance and social well-being, and the anomaly of thrift, had been left untaught too long. By thrift alone could pauperism, with all its attendant miseries, be abolished, and thrift must be an essential element in any movement by which the masses could be permanently and universally improved.

Mr. M. Parker (Leamington), Mr. Chancellor Christie, Mr. F. Curzon (organising secretary of the Yorkshire Union of Mechanics' Institutes), and Mr. Oulton (Liverpool) urged the advantages to be derived from penny banks being established in connexion with schools.

The Dean of Manchester objected to the care of the bank being thrown upon the teacher, and was supported by Mr. Bartley.

Sir Henry Cole said he believed if these banks had been established twenty years ago, and the children had then become accustomed to use them, it was his conviction that we should not have had to lament the late deplorable strike in Lancashire.

The Bishop of Manchester took the chair at the afternoon sitting of the Congress, and said there was one point which did not seem to have been taken into account in the papers read during the morning. It seemed to him to be most important that the conditions of life under which the great masses of the people lived in Lancashire should be taken into account. These conditions were such as to make the practice of domestic economy in the household extremely difficult, and, therefore, if it could be taught in the school it was all the more important.

The Rev. C. H. Collyns (Wirksworth) read a paper on the teaching of temperance in elementary schools, in which he urged that the general teaching of temperance should permeate the schools.

The Congress met again on the 28th ult., the Duke of Westminster presiding.

On the subject of "Health and Ventilation," a paper by Miss Lankester (secretary to the National Health Society), was read by Mr. Wood. The writer pointed out the necessity of teaching the laws of health to the young, which would raise among the poorer classes a demand for healthy conditions. She urged the necessity for open spaces in large cities, and gave an account of the work which had been done by the society of which she is the secretary. She advocated the conversion of dismal city churchyards into cheerful and bright pleasure-grounds, a work which, she pointed out, has been carried out in several London districts. Abundance of water, well-ventilated dwellings, and good sanitary arrangements were also urged in the paper as essentials to health.

A discussion followed, in which Mr. W. H. J. Traice, Mr. Bartlett, Mr. H. Pitman, and others joined.

The Bishop of Manchester said he could not but regard the views expressed by one or two of the previous speakers, and, to some extent, in the paper itself, as merely dreams, and utterly impracticable. If they could show any way in which the working classes could cultivate personal cleanliness they would be doing a great deal of good; but he could not understand how, in the conditions under which the working people lived, these dreams were to be realised. He invited the meeting to come down from the clouds. For one he did not wish to be considered one of the Laputan philosophers who dreamed dreams of a sort of ideal perfectibility which, as far as he could see at present, were not likely to be very immediately realised.

Miss Becker said she thought it was equally necessary that attention should be paid to the supply of pure air as well as pure water, and suggested that the authorities should determine to put down the smoke nuisance. If that were done the congress would not have been in vain.

The discussion was continued by Mr. J. Corbett, Sir Henry Cole, Mr. Fielden, and others.

Mrs. H. J. Roby (Manchester) read a paper on "The Dwelling: Warming and Ventilation," and Mr. Joseph Corbett (Manchester) a paper on "Ventilation."

The Rev. C. H. Collyns (Wirksworth) read a paper on "Food and Cookery, in relation to Teaching concerning the same in Elementary Schools." He urged the necessity of a knowledge of food elements, and the way to cook, especially in a thickly-populated country. The method he commended was, that children should learn something about their own bodies, and the purposes and uses of food; that they should also learn to cook the simplest substances, and how best to prepare them in order to obtain the cheapest and most savoury and most nutritive substance. He advocated the use of object lessons, in order to familiarise the children with the component parts of food substances.

Mrs. C. Clarke, lady superintendent of the National Training School for Cookery, contributed a paper setting forth the progress which the school had made. She said that instruction in cookery in public elementary schools as a branch of national education did not receive the encouragement hoped for from the various training colleges. From the 31st of March of last year, to the 1st of April in the present year, fifty-two students entered the National Training School to train for teachers, and forty-five diplomas to teachers had been granted. During the year 2,119 pupils had attended the school; in the year 1876-7 the number of pupils was 1,801. Besides the work done in the school, they had held sixty-nine classes in London and suburbs and the provinces, and they were prepared to open classes for cookery whenever they could obtain a suitable room, and a sufficient number of pupils. It was only by teaching the children of the working classes that any marked improvement in cookery could be attained among the people.

Miss Guthrie Wright (hon. secretary to the Edinburgh School of Cookery) read a paper on "The Extension of Teaching Cookery in Schools," in which she urged the importance of teaching cookery in elementary schools, by properly trained teachers.

Miss Emily Hall (hon. secretary to the Manchester School of Cookery) then read a paper on "The Teaching of Cookery in Elementary Schools." She urged that practical teaching should be given of such a kind as would be useful to the children in their after-lives;

therefore, only simple and inexpensive ingredients must be used, such as could easily be obtained by working women. The teaching, she thought, would fail to answer the end in view unless it included instruction in health matters generally.

A paper by the author of "The Official Handbook of Cookery" on "Domestic Economy Diplomas and Examinations for Cookery" was read by Mr. Bartley, in which the author urged the importance of an organised system of examinations in cookery in connexion with the National Training School.

A discussion followed.

Dr. Vaughan (Roman Catholic Bishop of Salford) said it seemed to him that there was a danger in reducing everything to a congress. People had eaten and lived for thousands of years without schools for cookery, and to reduce everything, even to the cooking of cabbages and potatoes, to a congress, seemed to him to be going altogether the wrong way. Let them have their theories by all means, but do not let them forget that they must depend to a considerable extent on the voluntary contributions of ladies and gentlemen, or the cost of establishing these schools would be one that would not be borne.

Mrs. Fenwick (Leeds) and Mrs. Fielden (Todmorden) replied to Dr. Vaughan.

The Chairman said the voluntary system had, no doubt, done much for this country; but, in the opinion of the people, it had not done all that should be done. It had been suggested to him that he should ask every lady who was willing voluntarily to assist in teaching cookery at elementary schools to hold up her hand. [Not a hand was raised.]

Miss Braun (Manchester) then gave some interesting illustrations of teaching children needlework.

Mrs. S. Fielden (Todmorden) read a paper on "The Advantages of Female Inspectors of Needlework in Elementary Schools." She condemned the system under which needlework was inspected by male inspectors, who really knew nothing of the work, and said that a woman trained to the needle from babyhood must be the better judge.

Miss Becker (Manchester), in a paper on the subject of amendments in the Education Code, said the importance of inculcating sound principles of domestic economy could not be overestimated. Increased attention was being given to the subject in connexion with the State, and it therefore behoved all concerned in the matter to bestow the most careful consideration in order that the efforts made should be wisely directed, for there was a danger that well-meant efforts to teach domestic economy might be misdirected, and there were symptoms that this danger was a growing one.

Mr. F. O. Ruspini (clerk to the Manchester School Board) read a paper on "The Working of the Education Code."

In the discussion which followed,

Sir Henry Cole said he hoped the congress would agree with him that the time had come when the revision of elementary education should be attended to. The Dean of Manchester seemed to be alarmed by a fear of an army of inspectors and their cost; but he (Sir Henry Cole) thought he could so arrange matters that the system of inspection should not only be more complete, but should not cost so much as it did now.

The Rev. Canon Toole said he feared that the houses of the people were not their homes as they once were, and, without a home, he was afraid to try to teach the people in the matter that had been under the attention of the congress would be of little use.

The Bishop of Manchester could not see how Sir Henry Cole was going to increase the army of inspectors without increasing the cost. He looked upon the remarks of Canon Toole as more sentimental than practical. The great demon which afflicted the working-classes was the demon of drink.

This brought the discussions on papers to a close.

Mr. W. Reyner Wood moved:—"That in order to obtain practical results from the Manchester Congress it is desirable that the executive and local committees remain in action until the next annual congress takes place, and that the report of the proceedings be published as early as convenient."

The Rev. W. J. Knox-Little seconded the motion, which was carried.

Votes of thanks to the Mayor for the use of the Town-hall, and to the Duke of Westminster for presiding, brought the congress to a close.

The *Manchester Courier* may be looked to for fuller notes.

LINCOLN DIOCESAN ARCHITECTURAL SOCIETY.

THIS society visited the town and neighbourhood of Great Grimsby on the 18th and 19th ult.

The Bishop-Suffragan of Nottingham read a paper on St. James's Church, Grimsby. He said that time was when seamen or fishermen, approaching Grimsby, saw six or seven churches rising above its houses, only one of which now remains. Two of these were there before the Conquest, the one perhaps represented by the still existing St. James's, the other by the lost St. Mary's, with its lofty tower, serving as a useful beacon to mariners until the sixteenth century, when it was pulled down. Besides these, there was the church of the Abbey of Wellow, founded for Black Canons by Henry I., 1110, unless this was identical with St. James's Church; that of the Benedictine Nunnery at St. Leonard's, founded 1185, by Henry II.; that of the Augustine House, founded 1280, and standing a little to the west of St. James's Church; that of the Templars, afterwards given to the Hospitallers of St. John of Jerusalem, on Spital-hill, without Bargate, dedicated in honour of St. Mary Magdalene; and that of the Franciscans, or Grey Friars, founded *circa* 1308. His Lordship referred to the various distinguishing features of the exterior and interior of the church, and, speaking of the chancel, expressed a hope that ere long it would be put in a state that was compatible with the remainder of the building.

An excursion was afterwards made in carriages to several villages in the neighbourhood. The first place stopped at was *Clee*, where the Bishop of Nottingham said that the tower of the church was one of the most ancient existing in the diocese, and there was reason to believe that it was built in the time of Edward the Confessor, if not before. It was well worthy of examination, both on account of its rudeness and its completeness. It all belonged to the earlier period, except the parapet above, which was of a later date. Of *Humberstone* Church, next visited, there was little to be said, except that it has a good Perpendicular tower in its entirety, and remarkable for its buttresses. The church had been rebuilt within the memory of man, and he trusted it would be again rebuilt within the memory of man. On arriving at *Tetney*, his lordship said the first point of interest was the tower, which was of the same date as the one they had just before visited. The company, after partaking of luncheon, proceeded to *Waithe*, where the Bishop said the church was possessed of one of those very ancient towers for which that part of North Lincolnshire was celebrated; and in this instance there was a peculiarity, inasmuch as it had been introduced between the nave and the chancel. Arriving at *Ashby*, the earliest portion of Ashby Church, his lordship remarked, was the southern wall of the nave, and outside towards the west end of the church was a portion of Early Norman architecture. Great alterations had been made in the church during the present century, and they were sad to contemplate; he hoped that a fresh restoration of the church would take place before long. At *Brigsley*, the Bishop said from first appearances that church might not be considered worthy of a visit, but a second examination showed that there were some features which were worthy of being inspected. Notwithstanding its superstructure, they found very clearly that the tower was of the Norman period; the chancel was of the Early English period, and there were two windows which belonged to the original fabric. On arriving at *Waltham*, the Bishop said he thought they must all feel refreshed by coming to a church which had been so carefully restored, and which was now so well fitted for divine service. The tower was an interesting specimen of the Early English period. *Scartho* was the last church visited. The tower was either Norman or Saxon, but the Bishop said he truly believed it belonged to the Saxon period. There were about seven or eight such in that part of Lincolnshire, but perhaps this was the best of all. He visited the church a number of years ago, and found it in a state of utter ruin, but now he had to congratulate the vicar and the parishioners for the admirable way in which it had been restored.

The annual dinner of the Society was held in the evening at the Royal Hotel, the Bishop in the chair.

A public meeting was afterwards held in the Town-hall, where the Society was received by the Mayor. An interesting paper on "British Hut Circles at Tetney" was read by the Bishop Suffragan of Nottingham, who introduced the subject as follows:—

"The art of building is the one that our Society studies, and this leads us to investigate all such specimens of ancient architecture as serve to illustrate the religious or secular history of the past, but especially those that are dedicated to God's service, from the earliest times. Thus we are occasionally led back from the thought of buildings constructed of marble, granite, stone, or brick, to consider those made of earth and sticks, or the simple materials of which the huts of many primitive people were composed, but little raised, as to art, above what beavers employ through mere instinct. Sometimes we study the crude architecture of the Saxon period, of which the once Cathedral Church of Stow still retains some remains, and at other times that of the Norman period, illustrated by the same venerable fabric, and many other examples, besides those of subsequent Mediæval centuries, indicating the gradual development of the construction and ornamentation of the churches and other buildings of that period, or of the grand old Tudor houses, with which our vernacular architecture concludes, before the irruption of a spurious Renaissance style destroyed not only the growth but the very *life* of English art as supplied to English building, so that we now live in a time that has no distinct architectural style of its own, and simply feeds upon the stores of the past, derived from foreign as well as English sources commingled in Babel-like confusion, commencing with Egypt and ending in the usual expressionless brickwork of the nineteenth century, from which all true art has fled. Perhaps it will be well, then, to advert to a happy time when architecture had a future before it, instead of only a past history, and especially as this will now enable me to unfold to you the discovery of some extremely ancient specimens of architectural remains at a spot not far distant from our present place of assemblage, viz., in the parish of Tetney."

The Rev. J. Wild, vicar of Tetney, followed with an interesting paper on Old Grimsby.

WATERWORKS.

Newbury.—New waterworks have been opened at Newbury. The well which supplies Newbury is situated in the valley at Northcroft, a short distance from the town, and is only 14 ft. deep from the surface, and 7 ft. in diameter. It was originally intended to carry it down to a greater depth, but at the depth of 14 ft. a strong spring was struck coming in from the chalk, and which yields from 20,000 to 34,000 gallons per hour. It was at first supposed that this was the valley water coming up through the gravel, and samples were therefore submitted to the late Dr. Noad, F.R.S., who pronounced it to be pure chalk water similar to that obtained from the North Kent Waterworks at Crays. From the well the water is pumped to a reservoir situated at Speen, at a height of 110 ft. above the surface of the well. The pumping station consists of an engine and boiler house, built with red brick, with strings of blue brick, and dressings of stone. The chimney-shaft is about 40 ft. high, and has an ornamental stone cap. At present there is only one engine and boiler on the works, but space is left in the building for another of each, which will be added when the increased demand for water renders it necessary. The water is lifted by four pumps, having cylinders 9½ in. in diameter, and 2 ft. stroke. The pumps are driven by a vertical engine of what is known as the Grover "Britannia" type, having an overhead cylinder 12 in. in diameter, with 2 ft. stroke. With this machinery over 16,000 gallons of water per hour are lifted into the reservoir at Speen. This reservoir is constructed of brickwork in cement, the sides sloping with a batter of 3 ft. to 1 ft. It is to be covered in with brick arches, and is provided with a valve chamber, 10 ft. by 6 ft. The reservoir is 42 ft. long, 30 ft. wide, and the height of the final water level is 15 ft. from the bottom; it is at present 10 ft. The reservoir is capable of containing 110,000 gallons. Pipes have been laid down throughout the greater portion of the town, and the services are being rapidly put in. The supply will be constant, and the charges are to be somewhat less than those in London. The engineer of the company is Mr. J. W. Grover, M.Inst.C.E., who has had charge of the undertaking since its inception three years since. The works were only commenced in May last year, and have been pushed on with such vigour that they are now nearly finished. The contractors are Messrs. Thomas Quill & Co., of London.

Halifax.—On the 28th ult., the members of Halifax Corporation paid a visit to the Widdop waterworks. The powers for the Widdop, or rather the Hebden scheme of the Halifax Waterworks were obtained in 1868, although it was not until 1871 that the first sod, preliminary to

the construction of the Widdop reservoir, was cut. At that time (says the *Halifax Guardian*) the supply of water for the town and district was derived from the high moorlands at the head of two large valleys,—that of the Hebble, the waters of which were gathered at Ogden; and that of the Lud, or Ludden, the waters of which were gathered at Warley Moor, Upper Dean Head, Lower Dean Head, and Castle Carr. Both these systems were connected, and their united waters ran by conduits to Ramsden Wood, where there is a receiving reservoir in the short valley below Mount Tabor. In addition to these was the large reservoir at Mixenden, for the purposes of storage, but notwithstanding that by all these resources storage room was provided for over 600,000,000 gallons of water, it was found during the droughty season of 1869 that there was not sufficient, and it was determined to proceed with the construction of the Works in the Hebden. Mr. Bateman, C.E., had long been engaged upon the designs for the scheme, which was to bring the waters of the Widdop, Greave, and Walshaw streams, into the general system of the Halifax supply, and with this end in view tenders were invited,—at the completion of the works at the head of the Luddenden stream,—for the cutting of a tunnel from Castle Carr, in the Luddenden valley, to Peckett Well, in the valley of the Hebden. Mr. J. Parkinson, who had constructed the Warley Moor and the three other reservoirs below it, was chosen for this work, and on the 13th of October, 1869, the first sod of the tunnel was taken off by Mr. Hutchinson, M.P., who was then mayor. This tunnel is about 2,508 yards long, being 4 ft. 6 in. in height, and about 3 ft. 9 in. wide, with a considerable fall towards Castle Carr. From the Peckett Well end of this tunnel a conduit is constructed, several miles in length, running along the face of the hill on the Wadsworth side, for a considerable distance, thence across the Crimsworth valley to Shackleton, forward to Walshaw, and under the moorland to Widdop. The site of the reservoir is admirably adapted for the purpose. High upon the hills forming the backbone of England, and near the boundary of the two counties of Yorkshire and Lancashire, the middle basin of the Widdop stream, which was of great length and depth, sloping away easily at the top, whilst at the bottom it was nearly shut in by the rising ground, was selected. At the bottom point an embankment has been thrown across the valley, 270 yards in length, and 77 ft. high at its highest point. This is composed of 145,000 cubic yards of earthwork, 30,000 yards of puddle, 3,500 of concrete, 7,100 of stone pitching, and 2,000 yards of soiling. There are the necessary floodways, and byewash, and the drainage area of the reservoir is 2,223 acres, with a water area of 92 acres, and its capacity is 654,000,000 gallons. The original expectation of the cost of the Widdop reservoir was 88,000*l.*, and the period of its construction was estimated at from two to three years. Unforeseen and almost unsurmountable difficulties, however, arose, and its construction has occupied seven years, whilst the cost is somewhere about 118,500*l.*

Innocuous Colours.—At a recent meeting of the Academy of Sciences a paper was read from M. Turpin, relative to a discovery he is stated to have made of certain brilliant colours which are said to be absolutely innocuous, and which, he urged, may be advantageously substituted for those now in use procured from mercury and lead. The first is a vermilion, which (according to *Galignani*) he obtains by taking a solution of the potassic or sodaic eosine of commerce (a coal-tar product), which, treated with an acid, throws down a precipitate of eosic acid. The latter, mixed with the hydrate of oxide of zinc, forms a very rich lake (eosinate of zinc), which may vary from the tint of the rose to a deep red, according to the quantity of acid employed. This colouring substance resists a relatively high temperature and sulphurous emanations. Pure fluoresceine (another extract from coal-tar) forms, with the hydrate of oxide of zinc, a brilliant yellow. And the combination of this substance, with the one above mentioned, gives a series of tinctorial matters varying from pale yellow to the deepest orange, according to the proportions used. These new substances, although soluble in water, can be employed for painting, for they are declared to be absolutely indecomposible by oils and essences, cover perfectly, and cost little.

ÆSTHETIC TASTES.

DEAREST MR. EDITOR,—Oh, how delightful, how ecstatic, it must be to you who have striven *so* long, as I once heard you say, to make good art cheap and cheap art good, to find how art is now permeating the houses and the hearts of the better people; how we talk about it,—how we think about it! I am just now doing my own house, and do so hope when it is finished that you will come and see it. I have a dado in every room, and such bright friezes, and am seeking piously for some old brass fenders. But this is not what I want to say just now. My object is a serious one,—a *very* serious one; it is to send you a proof beyond cavil of the spread of a *real* love of art. I was dining at dear Mrs. B.'s, of B— Hill (Oh! such a pleasant dinner! Everybody talking at once, and much of the talk quite understandable, though esoteric), and here I send you the darling bill of fare,—what we used to call the *menu*:—

"28 Jvne, 1878.

A MYSTERY!

Overtvre in White.
Prelvde in Brown.

Noctvrne in Pink and Yellow.
Scherzo in White.
Fvgitive Harmonies in Brown.
Symphony in White.

IDYLL IN PROSE.

Variation in Pink and Green.

LOVE AND LIFE!

Phantasy in Green.
Ethereal Rhapsody in White.
Arrangements in Amber and Cream.

GLACIAL CHAOS.

Decorative Svbjects in Metal.
Frvit and Flowers, vaguely treated."

When I first read it, I felt as if I were in the dear "Grosvenor." I could not quite understand it at the beginning, but I found it all out as the dishes came round. Isn't it *sweet?* "Overture in White," you know the sort of soup at once; what *can* "Fugitive Harmonies in Brown" mean but quails? And as to the "Idyll in Prose," it brings a little lamb alive before you, green fields and all. The "Phantasy in Green" puzzled me at first, but the moment I saw Gooseberry Fool coming round, my mind was at ease. Do make this known, Dear Mr. Editor, and you will help us up a step in the Higher Culture. DAISY.

P.S.—If you *should* hear of a brass fender, please let me know. And what *am* I to do if friends come into my rooms in dresses of the wrong colour? They destroy all my green and blue harmonies. Oh, and I must tell you; at dear Mrs. B.'s there was a very distinguished lady-sculptor present, and she was the only person who said nothing about art all dinner-time!

OVER-PRODUCTION.

SIR,—The strictures you pass upon the conduct of the leaders of the stonemasons in the late strike in London are well deserved by them. Except the late joiners' strike in Manchester, no more unwise act on the part of a body of men has been performed in our time. From a state of affluence they have reduced themselves to a condition of poverty. All their means are gone, and at the present moment the income does not suffice to meet the expenses arising from sickness, superannuation, and out-of-work pay, so that it is seriously contemplated making a levy of the whole trade to raise funds. This state of things reflects very seriously upon the foresight of the leaders of the society, the principal of whom has since then astonished the world by announcing himself as a candidate for the representation of an important Midland borough in Parliament. This movement of the stonemasons was an aggressive one, taken at an inopportune time. But the action of the cotton operatives in Lancashire during the late lock-out was a purely defensive movement, and ought not, I think, to be classed with the strike of the masons. They simply desired to keep the rate of wages they had for some time past received, and which the employers, in a very autocratic manner, determined to reduce by 10 per cent., alleging that the supply was greater than the demand, and that it was necessary to reduce prices in order to induce greater demand. To this the operatives agreed, on the condition that the supply be also reduced by the stoppage of the mills two days a week. So that the self-denial of the operatives was shown not only by consenting to a reduction of 10 per cent., but they were willing and anxious for a further reduction of 33 per cent. in order that prosperous times might be more speedily arrived at. The estimated weekly production of the mills which were stopped in Lancashire is 40,000,000 yards of cloth, so that the effect of the proposal would have been to reduce the supply by 13,000,000 yards weekly. This would have assisted the employers in two ways,—first, by reducing the demand for the raw material one-third, and, consequently, affecting a reduction in its price; and, secondly, by limiting the output by one-third, have kept up the value of the manufactured article.

That this proposal was good mercantile economy there cannot, I believe, be a doubt, and although the employers in the cotton trade did not so consider it, yet the principle has been recognised and acted upon in most other branches of manufacturing industry in this country. Take iron and coal as examples. The excessive prices obtained for these products in 1873 attracted to them such a large amount of both capital and labour, that mines were opened and furnaces built in every direction, with the result that a large quantity of these minerals was forced upon the market, already supplied to excess, and prices have gone down to a point lower than they were before the rise. Many of the works then opened do not pay to carry on at present prices, and it was stated by Mr. Macdonald, M.P., recently, that out of nearly 1,000 furnaces, only some 400 odd are making iron at the present time; and the output of the coal-mines is stated in a current trade report to be only about one-third of their capabilities, and with miners working four days a week, and yet a portion of this is being stacked, and prices are falling.

The same condition of things obtains in the tinplate trade. Some time ago the employers recognised the fact that the supply was largely in excess of the demand, and wisely resolved to curtail production, in order to obtain a remunerative price for their goods. Some makers, however, did not keep to the agreement, and the trade is consequently in a very unsettled state. Most of our export trades are in a similar position. How is this? The answer seems to be, that the productive power of the world in manufactured goods, at least, is greater than its power to consume such goods. England was up to recent times looked upon as the workshop of the world. Our inventive faculty, coupled with industry and perseverance, and the possession of various metals and minerals easy of access, caused us to be applied to for almost every manufactured production, and the demand has in times past been so great that not only have our children been withdrawn from the cultivation of the soil, but large numbers of our best workmen have been sent abroad with the most improved machinery, to set up manufactories in those countries which grow the raw material. In addition to these, other nations of Anglo-Saxon blood have sprung up and become competitors instead of remaining customers, until, at the present moment, we present the strange spectacle of a nation which has neglected, to a great extent, the cultivation of its own soil to become manufacturers for the world, now having little export trade, and yet dependent upon others for most of the food we eat. That this state of things cannot long continue is, I think, self-evident. A nation which cannot, and does not, produce the great bulk of the food it requires, is in a poor way. Agriculture is the very foundation of the permanent prosperity of any country. History presents many notable examples of this fact. The recent strike, and long-continued depression in trade, will not, therefore, be an unalloyed evil, if it awaken the thought that too many of our operatives are engaged in the production of goods which are being made in too great abundance for the wants of the world, and that their efforts would be more permanently rewarded if they turned their own attention and that of the rising generation more directly to the cultivation of the soil. Let the cry be, "Back to the land."

E. GRIMES.

St. Luke's Burial Ground.—On the 27th ult. the St. Luke's Burial Grounds, Old-street, which have been converted, at a cost of 600*l.*, into a public recreation-ground, were opened to the public.

INSTITUTION FOR THE EDUCATION OF THE DAUGHTERS OF MISSIONARIES, SEVENOAKS.

ON the 26th ult. the Right Hon. W. E. Forster, M.P., laid the foundation-stone of the above Institution, which is intended for the reception of 100 girls of all ages and denominations.

The design is in the Old English style, and is purposely simple and of inexpensive materials, variety of outline being chiefly relied upon for effect. The architect is Mr. E. C. Robins, F.S.A. The building will be faced with red bricks (red Dumfries stone being used for the chief entrance only). The upper or third story will be faced with vertical tiling. Tiles will cover the roof, with wooden verge-boards to the gables.

The plan of the building is a parallelogram, with an open court in the centre, which, on the ground-floor, is divided by the intervention of the dining-hall. At the north end of the dining-hall are the kitchen and domestic offices; on the south is the chief entrance,—on the right and left of which are the chief mistresses' and committee and reception rooms and library, forming the south side of the quadrangle. On the east side are the school and class-rooms for the junior school, and on the left side are the school and class-rooms for the senior division of the school. A small infirmary is situated at the north-west angle connected by a covered way with the main building. The laundry and fuel stores are situated on the north side of the kitchen-court which intervenes between them and the domestic offices, housekeeper's rooms, and cookery school.

The upper floors are arranged for dormitories, on a similar plan to that adopted by the same architect at Milton Mount College, Gravesend, by which separate and distinct chambers are provided for each inmate, enclosed within large dormitories, well lighted and ventilated. The younger children, who are to be under the care of nurses, have no separate cubicles.

Bath-rooms, water-closets, lavatories, housemaids' closets, &c., are situated at the four corners of the quadrangular block of the main building, except on the ground-floor, where they are placed parallel with the eastern and western corridors in the open central area.

The servants' dormitories are over the domestic offices, and form the upper story of the north side. This side is two stories in height only; the other three sides of the square are three stories in height. The dining-hall is a one-story building, with open-timber roof, and it is only in this apartment that a little freedom is observable from the rigid economy which elsewhere distinguishes the design, so far as superficial decoration is concerned.

The cost of the land, foundations, lodge, and fencing, amounts to 5,000*l.*, and a further 10,000*l.* are required to complete the building, which is deficient in no necessary convenience. The site of the building, 3 acres in extent, is situated on the high ground between the Vine Hall Estate and Knowle Park, near the Congregational Church. The present institution is at Walthamstow, where it was first established some forty years ago.

PARLIAMENTARY.

The Public Health Act Amendment Bill has passed its second reading in the House of Lords.

Public Works Loans.—In the House of Commons, on Monday last, Sir H. Selwin-Ibbetson intimated to Sir G. Balfour that the Treasury proposed to issue from time to time, in continuation of returns already issued, statements of the loan transactions both of the Public Works Loan Commissioners and the Commissioners of Public Works in Ireland.

Secretaries, Social Science Congress.—The list of the vice-presidents of this year's Congress, which is to be held at Cheltenham, is being rapidly filled up. The committees for the several departments of the Congress are also nearly completed, and the following have consented to act as hon. secretaries:—*Law:* Mr. E. T. Brydges (Town Clerk, Cheltenham), Mr. James B. Winterbotham, and Mr. J. W. Gabb. *Education:* Rev. R. M. Chamney (Principal of the Training College), Colonel Grove, and Mr. Tyrer. *Health:* Drs. Wilson and Ferguson. *Economy and Trade:* Capt. St. Clair-Ford, Mr. W. McLandsborough, C.E., and Mr. Cochrane. *Art:* Mr. J. Middleton and Mr. J. March Phillips.

ARCHÆOLOGISTS AT WISBECH.

THE proceedings of the British Archæological Association at Wisbech are now settled, and stand thus:—

Monday, August 19th.—Opening meeting at Council Chamber, Wisbech, at 2 p.m. Reception of the president and members of the Association by the Mayor and Corporation, and delivery by the Earl of Hardwicke, president of the congress, of the inaugural address. Under the guidance of the local committee, the members and visitors will proceed to the Church of St. Peter and Paul, where the Rev. Canon Scott, M.A., will give an account of its history and monuments. Afterwards the party will inspect the museum of the town, the remains of the castle, and vaults in High-street and Market-place. They will then proceed to inspect the barrow opened specially for the Association, and Leverington Church, the Roman bank, &c. On return to Wisbech, the public dinner will be held at the Rose and Crown Hotel, at seven o'clock, where the Earl of Hardwicke will take the chair.

Tuesday.—Excursion to Ely; walk to Cathedral and be there at 10·30 for examination and description of the edifice by Messrs. E. P. Loftus Brock, F.S.A., Thomas Blashill, R. J. King, and others. Lunch at Ely. Leave by 2 p.m. for Magdalen-road station. Drive to Middle Level Sluice, church, and hall at Wiggenhall St. Mary; then to Wisbech. Evening meeting.

Wednesday. — Inspection of the following churches:—Walsoken, Walton, Walpole, and Terrington. At each church due arrangements will be made for an explanation and description of its history, architecture, and monuments. The party to leave for King's Lynn at 1·15, reaching there at 2 p.m. Luncheon at the Globe; then drive to Castle Rising, with possibly a visit to Sandringham House and church. Evening meeting.

Thursday.—By train for Swaffham. Carriages to meet them there and drive to Castle Acre. Proceed by train to Middleton Towers, where Sir Lewis Wincop Jarvis, V.P., will read a short paper on the early history of the place. Afterwards the party will leave by train for King's Lynn, where they will be received by the Mayor and Corporation, and, after luncheon, proceed to the examination of the churches, remains of town walls, regalia at town-hall, MSS., &c.; train for Wisbech; evening meeting.

Friday.—By rail to Thorney; examination of abbey remains; then set out by carriages for Crowland for examination of remains of abbey, the ancient bridge, and luncheon; then on to Deeping St. James, for inspection of church and old house there; then by train for Spalding; visit church and cell. Special train for Wisbech, stopping at two or more churches on the way back to Wisbech. Evening meeting.

Saturday.—By train for Stamford, for the inspection of the churches, and thence by carriages to Burghley House, which will be described and commented on. The encampment at Castor (Durobrivæ of the Romans), and then on to Peterborough, for a short visit to the cathedral, and thence by train at 6·30 for Wisbech, in time for the evening meeting.

Monday. — By railway to Cambridge, for examination of the churches, colleges, old houses, and other antiquities of the city. These investigations will be continued on the following day, Tuesday, 27th of August, when it is hoped the president will be able to attend the final meeting of the congress, and bring the proceedings to a close.

ARCHÆOLOGICAL DISCOVERIES.

Roman Remains, Binchester.—Recently some excavations have been going on at Binchester, the site of an ancient Roman city, which have resulted in the discovery of a portion of a wall, 30 yards in length, 6 ft. high, and 9 ft. in thickness, most of which is stated to be in an excellent state of preservation. It is built of dressed freestone, and underneath the wall there is a complete arch.

Roman Remains, Lincoln.—Some interesting Roman remains have lately been discovered in the Bail, Lincoln. Means have been taken, under the direction of Mr. F. C. Penrose, for the preservation and exhibition of the remains. The columns will stand in a lofty semi-subterranean chamber or area, lighted from the street. Mr. Penrose strongly urged the importance of the removal of the very mean tenements on the south, which conceal the southern half of the portico.

ARCHÆOLOGICAL SOCIETIES.

Leicestershire.—At a recent meeting of the Leicestershire Architectural and Archæological Society, the Rev. J. B. Dickson, LL.D., of Glooston, read a paper on "Fotheringhay Castle." He said that in Domesday book the name of the castle is spelled Fotheringeia; Leland wrote it Foderingeye; it subsequently was subjected to various alterations till the present Fotheringay, or Fotheringhay, was decided upon; and the origin of the term is traced to fédan—to feed—and ha, or hay—a meadow. The only authentic description of the castle discovered is contained in a survey in the twenty-first year of James I. It consisted of two principal parts. The first a keep on the higher mound, and the second a large fortification on the lower. The first was reached through a double moat, and consisted of two stories, called upper and lower chambers, containing "goodly lodgyngs." From this you descended by a broad staircase to the lower fortification in which the "Great Hall" was situated. The Nen and a mill-brook formed part of the double ditches. Besides the mill-brook there was a pond—both have disappeared. The castle must have been standing in 1624, thirty-eight years after Mary's death, and twenty-one years after the accession of her son to the throne of England. That it was ordered to be demolished by James has been proved to be erroneous; the real destroyers, animated by no penitential sentiment, were the owners of the castle and manor at a later date. It became, in fact, a quarry for building purposes. The only picture in existence of this castle is said to be at Windsor.

North Oxfordshire.—The North Oxfordshire Archæological Society recently had an excursion to Chastleton House, Church, and Camp. The church is replete with interest; it dates back over eight centuries, and is associated with many distinguished names in Oxfordshire history. The mural tablets in the chancel are chiefly memorials of the Greenwood family, the patrons of the living, and possessors of considerable property in the parish. There is also one to the memory of Sir Richard Westmacott, the sculptor, who is buried in the churchyard, and to his son, Horatio, a rector of the parish. The chancel and tower are comparatively modern; the latter was destroyed by lighting, and rebuilt A.D. 1689. It was probably at that time that the church was seated with the high inconvenient pews, and that the unsightly gallery was put up which it is now proposed to remove. The church is about to be restored, under the direction of Mr. C. E. Powell, architect, London. In the afternoon Chastleton camp was visited, and some excavations examined. This camp or earthwork is on an eminence "foursquare" in shape, and is said by Beesley to be British, but adopted, altered, and improved by the Romans.

Birmingham and Midland Institute. — The members of the Archæological Section of the Birmingham and Midland Institute held their second excursion for the season on Saturday last. Assembling at noon at New-street Station, they took train for Cannock, where the church, which is principally Late Perpendicular in style, was visited. On leaving Cannock for the Chase, a fine pair of sixteenth-century gates at the old Manor House received the attention of the visitors. The weather was at this time all that could be desired, the summer heat being most enjoyably tempered by a fresh breeze, which continued till the party had reached the Chase. A thunder-storm approaching, the party were constrained to make a more speedy journey to Pillaton than would otherwise have been the case, and fortunately reached the hall without any sprinkling. Pillaton Hall, upon which Mr. Everett read a short paper, was formerly an extensive moated mansion, and was for many generations the seat of the family of the Littletons. The existing portions of the ruins are principally the brick gatehouse, having semi-circular turrets and dome-shaped roofs. This and the chapel are of the early sixteenth century, the remaining portions being Elizabethan. The visitors proceeded on to Penkridge, and the church (a Perpendicular structure) having been inspected, the party returned to Birmingham.

Asphalte Paving at Aldershott.—The Brunswick Rock Asphalte Paving Company have recently completed the paving of Wellington-street, in that town.

THE CERTOSA AT PAVIA; AND THE BASILICA OF CONSTANTINE AT ROME.

I SEEK your kindly aid in obtaining certain information about these two buildings. I am desirous of stating the dimensions of the great south cloister at the Certosa, but can find nothing reliable. The fine work by Durelli gives a plan; but it appears to me that both the scales of mètres and of Milanese braccia are wrong. By the former the court measures 22·2 by 26·0, being equal to about 73 ft. by 85 ft. English; by the latter, it measures 37 by 43, being equal to about 64 ft. or 71 ft. by 74 ft. or 82·7 ft. English, according to the two values given to the Milanese braccia. One writer in English (I think it is "Murray's Handbook") gives the dimensions 334 ft. by 412 ft., which is probably about correct. Has any one of your readers ever felt the interest to measure the vast quadrangle, whilst there? The above dimensions taken from the scales are the clear open space between the arcading. Writers differ, too, as to whether the residences of the monks have one or two rooms on the upper floor.

I also cannot find any very reliable English measurements of the Basilica of Constantine, formerly called the Temple of Peace, at Rome. Mr. Gwilt, in the "Encyclopædia of Architecture," and Mr. Fergusson, in his "History of Architecture," have given a few general ones; the best, perhaps, are those supplied by Desgodetz in his "Antiquities of Rome," 1682. This grand ruin of a noble edifice must surely have found a measurer among the many English students who have visited Rome. Being desirous of adding the above dimensions in the respective articles in the "Dictionary of Architecture," I shall be obliged by having them as early as possible, the articles being in type, and would have been printed, but the hope arose that the measurements might be forthcoming. Hence this inquiry. WYATT PAPWORTH.

33, *Bloomsbury-street*.

RUDE STONE MONUMENTS.

SIR,—In listening to Mr. Roger Smith's and Dr. Phené's interesting papers on the above subject, it struck me that the great stone circles of Stonehenge and Avebury were probably great places of assembly, where the ancient British Eistedvoden were held, where the bards contended for prizes, and where chariot races and athletic contests took place. There is somewhere a record of a British bard having travelled in Greece, of his having either studied the Pythagorean philosophy, or under Pythagoras, and of his appearance, and of his costume. It is also recorded, if I recollect rightly, that this bard revisited Greece. There was, doubtless, a much greater degree of intercourse, in early times, between the civilisations on the shores of the Mediterranean and this country, more especially through the Phœnician argosies, than we are apt to imagine. The British Eistedvodt, which is now only thought of as a Welsh institution, bore, in its ancient integrity, a close resemblance to the Olympian festival. It formerly included both intellectual and physical contests. The intellectual contests in poetry and music alone survive. There is also, I believe, a tradition that Grecian characters were used in the bardic writings.

It also struck me that these colossal stones may have been the points of support to either temporary or permanent wooden constructions for roofs and seats. The skeleton roof being, perhaps, finally covered in with either skins or canvas, the large mound encircling all at Avebury might have served both for a *vallum* and as the pit for the masses.

These great stone circles were probably the rallying centres for religious ceremonies, for the discussion of public affairs, for national games, and for defence. W. CAVE THOMAS.

"THE ADORNMENTS OF THE OBELISK."

THERE is a medium in all things, and while it would be almost absurd to adorn the base of the London Obelisk with modern strange sphinxes, yet the monolith has another meaning to an English eye besides its archaic one, and that meaning is, as Professor Erasmus Wilson has expressly stated, to commemorate "British valour by sea and land." This can best be done by bas-reliefs and inscriptions upon the base of the Obelisk. Such bas-reliefs and inscriptions are rightly placed on the pedestals of the obelisks of Constantinople and Paris; in both instances also the machinery employed has been deemed worthy of representation; and it is only just to the interest and ability shown by Mr. John Dixon in the mechanical contrivances employed by him as well as the invention of the *Cleopatra* ship, to hand down to posterity the record of them upon the base of the monument, which, to a great extent, England owes to his exertions. W. R. COOPER.

"AN ACT OF BARBARISM."

SIR,—Will you allow me to call the attention of your valuable journal to an act of wanton and wilful barbarism which is about to be perpetrated?

The trustees of Blundell's School, at Tiverton, having become very wealthy, have determined to remove that school to a new site; and for no reason, except ignorance be a reason, have determined to pull down the old building, erected by the founder of the school in the reign of James I.! The building in question is one of the finest examples of the Jacobean style in the country, and is a most interesting and beautiful specimen of English scholastic architecture. Its destruction will be a crying disgrace to the age, and it is with a hope that you will raise your voice against this most wanton act of barbarism that I address you upon the subject. I may mention that Blundell's School has been very carefully delineated by Mr. Dollman in his "Civil and Domestic Architecture."

H. W. B.

ORGANS.

Gloucester Cathedral.—At a meeting of the Dean and Chapter of Gloucester, on the 27th ult., the subject of the reconstruction of the organ of the cathedral came up for consideration. Mr. Waller, the cathedral architect, presented plans of a new screen, to take the place of the present heavy and modern stone division between the nave and the choir. Mr. Waller's design (according to the *Gloucestershire Chronicle*) is in character with the stalls and oak-work, the screen being as nearly as may be a repetition of the stall-work of the choir, less a doorway with canopies in the centre, as at present arranged, the backs of the stalls being opened between the nave and the choir. The organ is arranged for in two divisions, one occupying the last of the arches on the south side of the nave, and the other the corresponding arch on the north side, so that the long-desired vista from either end of the cathedral will be obtained if this design be carried out. The old organ-cases will be carefully preserved, and erected in the north and south aisles at the backs of the two halves of the new organ. Unanimous approval of the design was expressed by the capitular body. The specifications for the organ have been given by Mr. Willis, of London, embodying suggestions made by Mr. Harford Lloyd, the organist.

Leek.—A new organ has lately been erected in the old parish church, Leek, by Messrs. Jardine & Co., of Manchester. It has cost between 1,200*l.* and 1,300*l.*, and contains 42 stops, three manuals (CC to G), 56 notes, and 1,798 pipes.

West Bromwich. — Mr. Alexander Brogden, M.P., has presented an organ, erected at a cost of more than 1,200*l.*, to the West Bromwich town-hall. The instrument contains 2,168 pipes,—viz., 793 to the great organ, 781 to the swell organ; the solo and echo organ combined, 464; and the pedal organ, 130.

Northenden.—A new organ has been presented to the parish church of St. Wilfred, Northenden, near Manchester, by Mr. R. P. Percival. It is by Messrs. Hill & Son, of York-road, N., and is worked by a hydraulic engine. It contains three manuals and pedal, with a tremulant, five couplers, and five composition pedals. In all, there are 1,108 pipes, the longest of which measures 16 ft. The case is of Dantzic oak, and was designed by Mr. Redford, architect, Manchester.

Salisbury Cathedral.—During the past few days two holes have been cut through the east wall of the north transept of the cathedral, and a space excavated in the concrete outside preparatory to the erection of the gas-engine which is to blow the new organ. Whether the arrangements which are being carried out are likely to mar in any degree the exterior view of that part of the building is not yet evident; but if they do it will, as a local paper says, be a matter of much regret. No doubt the plan has received due and competent consideration, but it is highly desirable to avoid, if possible, anything, however small, which may prove offensive to the eye, particularly in those parts which are exposed to public view, as is the whole of the north side of the cathedral.

Weedon.—A new organ has just been erected in Weedon Church, Northamptonshire, by Messrs. Bishop & Son, of Marylebone-road. It has cost some 400*l.*, and was originally built by Nichols, son-in-law of the well-known G. P. England, but has been entirely remodelled and very considerably enlarged, only a few of the swell pipes remaining from the old organ. There are eight stops in the great organ. The swell has six stops. There are three couplers: swell to great, swell to pedal, and pedals to great; and three composition pedals to the great organ. The organ is full compass, fifty-six notes, and all the stops go through. There are thirty pedal pipes.

DOCKS AND HARBOURS.

Madras.—A visit was recently paid by Sir Andrew Clarke to Madras for the purpose of inspecting and reporting upon the harbour works which have for some years been in progress with no satisfactory results, although large sums of money have been expended upon them. It is stated that Sir Andrew Clarke, while he does not totally condemn the harbour, is of opinion that the design will have to be very considerably modified before it can be of any practical use. It has been estimated that a sum of 700,000*l.* would suffice to complete the work, and provide Madras with a suitable harbour; but this estimate is considered by Sir Andrew Clarke to be much too low, and he calculates the outlay that will be required at two millions at least.

Aberdeen.—The Aberdeen Harbour Board met in committee on the 18th ult., when the whole question of the new works to be provided under the proposed new Harbour Bill was considered by a committee. In the first instance, it was resolved to drop all idea of extending the North Pier further at the present time, and Mr. Dyce Cay's proposal to build a dyke across the present channel of the river so as to divert its main current into the sea behind the south breakwater was given up. It was, however, resolved to construct new gates for the south entrance of the Victoria Dock, and also to lower the sill of the dock by from 2 ft. to 4 ft. It was resolved to carry on dredging for the widening and deepening of the channel, and to set apart a sum of 12,000*l.* for this purpose. The committee was unanimous in approving of the proposal to construct a graving dock, 40,000*l.* being the estimated sum. The new wharf in the old channel of the river for the North of Scotland and Orkney and Shetland Steam Company will also, it is recommended, be included in the works under the Bill, should it receive the sanction of Commissioners when finally reported on. For this purpose 8,000*l.* were set aside, and it was further determined to schedule a sum of 11,000*l.* for filling up the old bed of the river from the Timber Bridge to Ferry-hill. For the building of a quay-wall along the south side of the upper dock 21,000*l.*, and for erecting warehouse accommodation at the south side of dock, 3,000*l.* are to be asked. The total sum proposed to be borrowed under the new Bill is 120,000*l.* Details may be tabulated thus:—Graving dock, 40,000*l.*; dredging channel, 12,000*l.*; new dock-gates, 11,000*l.*; lowering sill of dock, 14,000*l.*; quay-wall (upper dock), 21,000*l.*; filling up old bed of the river west of the bridge, 11,000*l.*; new wharf for the North of Scotland Steam Company, 8,000*l.*; dock warehouses (say), 3,000*l.*,—total, 120,000*l.*

An Alleged New Mineral: "Vermicellite."—It is stated that Mr. C. E. Manby, analytical chemist, Barrow, has discovered a new mineral in the boulder clay of Furness. In a paper read before the Barrow Naturalists' Field Club, he says he names the new mineral vermicellite, owing to its similarity in many respects to the vermicellite of Pennsylvania, belonging to the mica group. The distinction between the metals appears to be a great increase of ferric oxide in vermicellite, a decrease of alumina, silica, and water, with the addition of new compounds, titanic and phosphoric acids, lime and soda.

ILLUMINATING GAS FROM WATER OR SEWAGE.

MR. STEPHAN, of Worcester, claims to have discovered a process of converting steam into a gas which can be used for illuminating purposes. Mr. Stephan, who has protected his invention by patents taken out "all over the world," has now made public some particulars of the process, which, if it is found to be thoroughly successful, will enable artificial light to be supplied at a very cheap rate. In the words of the *Worcestershire Chronicle*, under Mr. Stephan's process, "all sewage matter is to be easily disposed of, gas produced 'free, gratis, for nothing,' and yet an immense profit be made. He at first estimated the profit at 150 per cent., and this estimate he still clings to as correct. The only question is whether, taking all the advantages promised into consideration, 150 per cent. is really not below the mark!"—

The process is thus described:—

"A boiler, to contain water or sewage, as the case may be, is placed over a retort, underneath which is a fire-hole, the flues of this ramifying round both retort and boiler, and the heat passing through these flues causes both boiler and retort to be heated simultaneously. In the case of making gas from sewage or any animal refuse, solids and liquids are put into the boiler, and the liquid parts, being evaporated by heat, are passed, in the form of steam, through a pipe into the back end of the retort, where are placed a number of perforated iron discs. These are perforated in various ways, in order that the passage of the steam through them shall not be direct, but be impeded as much as possible, the result being that by the time the steam has passed through the whole set of discs it issues as hydrogen gas, the oxygen having been deposited on the iron in the form of magnetic oxide. Hydrogen would of course, on ignition, give off a flame of a pale blue colour, which would not be luminous. The gas is then passed through layers of limestone packed closely in the retort, and in its progress becomes saturated with carbonic acid. At this stage the light burns with a reddish tint. The residue, or solid matter of the sewage, is then brought into use. Having been allowed to subside in the boiler, it is found to be in the form of a dry, black, inodorous hydro-carbon, and in this state it is taken from the boiler and placed in the front part of the retort, next to the limestone already referred to. The application of heat causes an abundance of arbon to be given off, which, being absorbed by the lightly carburetted hydrogen (which the gas has become by passing through the limestone), it becomes highly luminous, incondensible, and permanent. The residuals from the retort are soda ash, lime for building purposes, cement, &c., and from the condenser an abundant supply of ammoniacal liquor, tar, pitch, and lubricating grease. All the above are of course derivable from the sewage and limestone, and some of these products would be extremely valuable for enriching the soil. Thus the sewage could, as so many people argue that it ought to, return to the land in the form of a fertiliser."

The above process (says the *Chronicle*) is applicable more particularly to towns. In carrying it out in practice it would be most convenient to have the gasworks erected near the sewage outfall; thus the sewage could gravitate into the works, without the necessity of pumping, and the gas being manufactured at a low level would readily rise through the mains to almost any height. Mr. Stephan declares that, with proper appliances, no unpleasant smell would attend the manufacture. No fuel would be required for heating the boilers and retorts; such an enormous quantity of gas would be produced by the consumption of, say, the sewage of Worcester, that there would be far more than would be necessary for the lighting of the whole town, and for supplying heat to the boilers.

Mr. Stephan has made a formal application to the Birmingham Corporation Gas Committee, for leave to experimentalise, at a portion of the gasworks there, with sewage.

PREVENTION OF DECAY IN WOOD.

A METHOD of treating wood to preserve it from decay has (says the *Mining Journal*) been invented by Mr. Waldemar Thilmany, C.E., of Cleveland, Ohio. After the wood has been steamed in a closed cylinder or chamber to drive off the sap, moisture, and other matters, a vacuum is created by the action of a pump; then the wood is charged with a solution of sulphate of zinc and iron, either combined or separately. The proportion should be about one pound of the sulphate to 100 lb. of water, more or less, depending upon the nature of the wood, and the purpose for which the treated wood is designed. The surplus liquid or residuum is discharged from the chamber, and then a solution of chloride of barium is forced or charged with the wood. The proportion of the chloride of barium used with the sulphate of zinc or of iron is about two-thirds by weight of that of sulphate of zinc or of iron in 100 lb. of water; that is to say, if three pounds to the 100 lb. of water of sulphate be used, then the chloride of barium solution would require to be about two pounds to the 100 lb. of water. The application of the chloride solution may precede that of the sulphate solution if more convenient, the object being to produce by chemical action within the pores of the wood an insoluble sulphate of baryta and chloride of zinc or iron, as the case may be. In carrying out the process the wood or timber is placed in a closed chamber of iron or copper, capable of sustaining the pressure to which it may be subjected by the steam or otherwise in the process—say, five to eight atmospheres, more or less. By these means the crude sap, moisture, and like matters are vapourised, and the soluble parts or matter of the wood eliminated and drawn off by a vacuum-pump, and a vacuum being formed in the chamber, the wood becomes very readily charged. There is then introduced under hydrostatic pressure a solution of either sulphate of iron or sulphate of zinc, thus filling the cells and pores of the timber therewith. The surplus solution in the chamber is then drawn off, and a solution of the chloride of barium introduced under hydrostatic pressure. Then, it is said, the elective chemical affinity directly decomposes the soluble zinc or iron salts, forming the insoluble sulphate of baryta and chloride of zinc or of iron in the cells and tissues of the wood, although the chlorides of zinc and iron are soluble alone, but when combined with the sulphate of baryta there is formed (according to the metal used) chloride of zinc or of iron, which becomes so united in the tissue of the wood that it cannot be washed out when exposed to the action of water or moisture, and by these means, together with insoluble sulphate of baryta, the decay of the wood is arrested.

In treating large timbers it may not be convenient to subject such pieces to the action of steam in a chamber. In such instances it is deemed sufficient to charge such timbers with the sulphate of zinc or of iron and the chloride of barium without subjecting the pieces first to the action of steam. These agents may be forced into and through the structure of the wood by hydrostatic pressure. In this manner the crude sap and albumen of the wood are driven off, and their place will be taken by the solutions of the chloride of barium and sulphate of zinc or of iron, and the result of this mode of treatment will be the same as when the wood is first steamed; but such treatment is only necessary for large timbers, the process being slower than when the wood is first steamed.

The cost is said to be comparatively slight.

STREET ARCHITECTURE IN THE PROVINCES.

Lincoln.—New business premises have just been erected in Silver-street, Lincoln. The style adopted is that of Flemish Gothic, of the fifteenth century, and the high-pitched roof and corner turret, the transomed windows, and quaint flat red tiles, as seen from High-street, are suggestive of the picturesque buildings of Bruges, Ghent, and other towns in the Low Countries. The buildings have been erected from designs by Mr. W. Scorer, of the firm of Watkins & Scorer, architects. It is intended to build other premises of a similar description on a vacant piece of ground adjoining.

Northwich.—A portion of the extensive business premises which are being erected in High-street, Northwich, for the executors of the late Mr. W. Beckett, has been opened. The style of architecture is "Old English," and the building occupies the space upon which three separate shops formerly stood, namely, Nos. 27, 29, and 31. The ground floor contains draper's shop, carpet shop, tailor's shop, tailor's cutting room, and general office. The architect is Mr. Harold Hignett, of Chester; and the builder, Mr. Richard Beckett, of Hartford.

Carlisle.—A new block of buildings has been erected for Messrs. Smith & Watt, of the firm of Little & Ballantyne, on the site of the old Bush Hotel, Carlisle. It is built of tooled red stone, is four stories in height, exclusive of basement and attic floors, and fronts to three streets, namely, 36 ft. to English-street, 65 ft. to the Viaduct, and 36 ft. to Blackfriars-street. The style of architecture is that of the Stuart period, and the building is surmounted by a Mansard roof. The cornice all round is inlaid with white tiles, decorated with floral designs. The most prominent entrance is that to the shop of Messrs. Little & Ballantyne. The new hotel has its principal entrance from the Viaduct. At one corner of the block is a shop fitted up for a fishmonger. The architect is Mr. C. J. Ferguson, and the builders are Messrs. Beaty Brothers.

BATHS AND WASHHOUSES.

Bermondsey.—The Commissioners of the Bermondsey Baths and Washhouses have recently issued their annual report, which states that since the opening of the establishment in 1854 both the baths and washhouses had been fully appreciated by the inhabitants. The number of bathers for the year ending the 23rd of March last had been 101,541, 5,555 of whom were women. The number of washers was 35,291, and the gross receipts 2,285*l.* 11s. 6d., which, after the payment of all expenses, left a balance in hand of 106*l.* 14s. 4d., the smallness of the balance being accounted for by the fact that the commissioners had decided on sinking a well, by which they hoped to secure a larger supply of water, of pure quality, at a considerably less cost.

Boston.—Mr. Wheeler, borough surveyor, Boston, Lincolnshire, has made an estimate of the cost of erecting new baths, near the Public Park, the baths to contain a salt-water swimming-bath open to the air, six hot-water salt baths, and a salt-water shower-bath, a house for the attendant, with all the necessary belongings. The estimated cost is 2,500*l.*, including boiler, engine, and fittings. Mr. Wheeler has also prepared plans of baths and washhouses. The building is arranged for twenty-four women washing at the same time, and provided with all necessary appliances, the estimated cost being,—land, 150*l.*; buildings, &c., 550*l.*; boiler, tubs, and engineer's work, 800*l.*—Total, 1,500*l.* Mr. Wheeler suggests two sites for the building, one in St. George's-lane, and the other on the Irby estate, both behind the White Hart, the former being the most eligible. The above suggestions will come before the town council.

DRAINAGE ITEMS.

Newton Heath.—The Newton Heath Local Board has, in connexion with the Droylsden-road drainage scheme, received tenders for the construction of a main trunk sewer from the present culvert near the Manchester Corporation Cemetery to Church-street, and from Crown Point to Scutchbottock. The tender of Messrs. G. J. Foote, of Bury, for the sum of 3,333*l.*, was accepted.

Withington.—Mr. J. Thornhill Harrison, C.E., has, on behalf of the Local Government Board, held an inquiry at the offices of the Withington Local Board in reference to an application by the Board for sanction to borrow 105,000*l.* for works of sewerage, and 3,000*l.* for private street improvements. The Board was represented by the chairman (Mr. E. H. Fuller) and several members; Mr. Newton, C.E.; the surveyor (Mr. J. Swarbrick); and the clerk (Mr. G. Evans). The money required for private improvements is intended to be expended in the paving and sewering of Withington-road, Whalley Range, and Lloyd-street, Chorlton-on-Medlock. The larger sum is required for the construction of a sewer, recommended by Messrs. Cawley & Newton, to relieve a large portion of Withington and Lady Barn district of its sewerage, and will afterwards form a part of a larger scheme which is being prepared for the drainage of the whole district. Opposition was not offered against either application.

Suck.—The *Belfast Newsletter* says that the O'Conor Don, M.P.; Mr. Wills Sandford; Gen. Mitchell, R.A.; and other spirited and enterprising landowners in the West of Ireland, have set an example of perseverance and self-reliance which we heartily commend to those who are anxious to promote the drainage of Lough Neagh. Although the Suck Drainage Bill only received the Royal assent last month, the gentlemen who compose the Drainage Board have already met for despatch of business, elected a secretary, also Mr. J. Lynam, C.E., as engineer, and have issued certain advertisements calling for tenders to carry out the drainage project. The works,—none of a difficult nature,—are expected to cost about 130,000*l.* The river Suck, freed of a number of eel weirs and ancient milldams, and allowed to flow untrammelled in its natural channel, will remedy the disgraceful state of things entailed by annual flooding of many thousands of acres, and the whole district will be materially improved by the drainage.

COMPENSATION CASE.

MARSTON *v.* THE METROPOLITAN BOARD OF WORKS.

THIS was a heavy compensation claim (heard in the Sheriffs' Court, Red Lion-square, on the 26th ult., before Mr. Under-Sheriff Burchell and a special jury), amounting to upwards of 23,000*l.*, by the freeholder of the Café de la Régence, at the corner of Windmill-street and Tichborne-street, Haymarket, required for the formation of the new street from Piccadilly-circus to Oxford-street, under the Metropolitan Street Improvement Act of 1877. A special jury was summoned, and at the sitting of the Court only nine answered, and it was arranged to try by that number without praying a tales. The jury proceeded to the *locus in quo*, and took a personal inspection of the freehold, &c.; for which compensation was claimed, and afterwards returned to the court to hear the evidence.

Mr. Serjeant Parry and Mr. Lord appeared in support of the claim; Mr. Philbrick, Q.C., and Mr. Freeman for the Metropolitan Board of Works.

After some consultation, counsel informed the Court that the parties had agreed upon a sum to be paid as compensation to Mr. Marston as the freeholder of the property, and that sum was 17,050*l.*

Mr. Under-Sheriff Burchell instructed the jury to return a verdict for that sum by consent, and it was thereupon recorded.

ARBITRATIONS.

Carlisle Town Improvement.—Three lots of property which are required by the Corporation of Carlisle for the purposes of town improvement were the subject of inquiry on the 20th ult. by a court of arbitration in the County Hotel, Carlisle. The first property is situated on the west side of Devonshire-walk, and partly faces Caldew Bridge, and consists of four tenements, which bring in a gross rental of 37*l.* 14s. per annum. Mr. J. C. Hetherington, architect, valued the property at 760*l.*, adding ten per cent. for forced sale, 836*l.* Mr. Hodgkinson said the figures given were fair and equitable. On the other side Mr. C. P. Hardy considered the present rental fair, and assessed the property at 512*l.* 10s. 8d., and adding ten per cent. the figures became 563*l.* 15s. 9d. Mr. Banks, town surveyor, Kendal, made the gross value 558*l.* 3s.—Decision was reserved. Mr. Hedley, Newcastle (instructed by the town clerk), was arbitrator for the Corporation; Mr. Brierley, Preston (instructed by Mr. Ostell, of the firm of Messrs. J. R. Donald & Ostell) was for Mr. Jordan, the owner of the property; and Mr. Fenwick, of Leeds, was the umpire. The court was called upon to assess the value of the inn belonging to Mr. J. T. Hill. Mr. Wannop, for the owner, explained that the rent was 43*l.*, but was merely nominal, as the owner's daughter was tenant. Mr. Hill, who claimed 1,300*l.*, gave evidence, and the decision was reserved. This was also the case respecting a cottage in the same neighbourhood. It contains three rooms, and the owner claims 320*l.* for it.

Middlesbrough Sewerage.—The award of Mr. T. Gow, umpire in the arbitration proceedings between the Middlesbrough Owners, Miss Brown, and the Corporation, has been received. It is dated the 8th ult., but it was not taken up till last week. The first claim was a joint one, by Messrs. Pease and Miss Brown, they claiming 4,237*l.* 10s. The umpire has awarded 1,599*l.* 9s. in respect of land damage, 72*l.* for silting up to the time of arbitration proceedings, and 648*l.* for prospective silting, making together 2,319*l.* 9s. In the second claim, Messrs. Pease asked for 2,200*l.*, and the umpire has awarded 1,250*l.* The third claim was by Miss Brown, who sought to recover 4,142*l.* 70*l.* have been awarded for occupation of land in putting down a sewer, 210*l.* for silting up to the time of arbitration, and 1,800*l.* prospective damage by silting, making 2,080*l.* The total sum awarded is 5,739*l.* 9s., and the Corporation will also have to pay about 550*l.*, the umpire's charges, and some 1,500*l.*, the other legal expenses. A special case has, says the *Darlington and Stockton Times*, been granted as regards the amounts awarded in respect of silting, but should the Court rule against the claimants, the Corporation will doubtless be compelled to deodorise the sewage before it is sent into the river.

Chesterfield.—The dispute between the Chesterfield Corporation and Newbold Local Board to decide the price which the former should pay to the latter for 4 acres, 2 roods, and 11 perches of land for a sewage-farm has just been decided. Both boards required the land for the same purpose, but Chesterfield obtained Parliamentary powers first; hence the dispute. Newbold Board wanted 1,600*l.* for it, and the Chesterfield Corporation offered them 1,000*l.* The arbitrator, Mr. J. Coleman, of Derby, has awarded 1,020*l.* as a proper price for the land, each side to pay its own costs.

HOSPITALS AND INFIRMARIES.

Hertford.—The Hertford Infirmary has lately been considerably enlarged, from plans by and under the superintendence of Messrs. Smith & Austin and Mr. T. Tayler Smith. The new portion of the building covers nearly as much ground as the old; the ward space is nearly half as much more than it was originally, and with the new sanitary conveniences the institution may be considered as being doubled in size. The cost of the new works will amount to 3,000*l.*, or thereabouts. Mr. Farley acted as clerk of the works, and Messrs. George Ekins & Son, of Hertford, were the builders.

Plymouth.—It is proposed to abandon the present building used as the South Devon and East Cornwall Hospital at Plymouth, and to build a new hospital on an elevated site in the neighbourhood of the prison and workhouse. The proposal is meeting with some opposition, on the ground that the present site is the most convenient, and sufficiently open and airy, having the Hoe Park, Princess-square, and the Corporation buildings in its immediate neighbourhood.

RAILWAYS.

Dover and Deal.—On the 29th ult. the ceremony of cutting the first sod of a short connecting link of railway between Dover and Deal was performed by Earl Granville, the Lord Warden of the Cinque Ports. The South-Eastern and the London, Chatham, and Dover Companies have combined to carry out this important link of communication. Mr. Mills is the engineer of the line, and the contract has been taken by Mr. Walker, of Cannon-street. The cost will be about 200,000*l.*, and the work is to be completed in 1880. There will be two stations on the line, one at Walmer and one at East Langdon (for St. Margaret's). There will be a tunnel, about a mile in length, before the line joins the London, Chatham, and Dover Railway at Crabble, about a mile from the middle of Dover.

Ballymena and Larne.—In the House of Lords, on the 24th ult., the Ballymena and Larne Railway Bill was read a third time and passed. In the course of the debate, the question of gauge cropped up. Lord Waveney called attention to a clause under which the promoters would be compelled to purchase more land than was absolutely required for the making of the railway. In some parts of Ireland the gauge was 5 ft. 3 in. while in places where that gauge could not be made, the lines were allowed with only a 3-ft. gauge. In this case, the line would be of 3-ft. gauge, but a clause had been inserted to compel the promoters to purchase sufficient land to construct, if necessary at some future time, the broader gauge. This was a hardship, because it was impossible that the broader gauges could ever be constructed, or, if made, could be of any use in connexion with this particular line.——The Lord Chancellor said the purchase of the additional lands would put the promoters to the extra expense of 500*l.* per mile for no useful purpose.——The Duke of Marlborough, in the interest of the smaller railways of Ireland, trusted their lordships would not insist upon the insertion of a clause to compel the purchase of land for the construction of the broader gauge. The 3-ft. gauge was sufficient for mineral and agricultural traffic, and would in no way come into competition with the broader gauges throughout Ireland.——Lord Redesdale said he was only carrying out the provisions of the existing law in seeing that this clause was inserted in the Bill, the object being to prevent the construction of competing gauges in Ireland.

Millbrook.—The east window of the new church at Millbrook, Hants, has lately been filled with stained glass by Messrs. Hardman & Co., at a cost of about 400*l.*

CHURCH-BUILDING NEWS.

Westminster.—St. Margaret's Church, Westminster, was re-opened on Sunday last, after restoration, towards which the Queen has subscribed 100 guineas. Among other contributors have been the Dukes of Buccleuch and Westminster, Lord Hatherley, the Speaker, Colonel Edwards, M.P., Sir Henry Hunt, and many others. There is a deficit of 3,000*l.* An altar-cloth has been presented by Sir Walter and Lady James; a credence-table of marble and alabaster by Sir Stafford Northcote, whose third son has just been ordained to the curacy; and an eagle lectern, from an antique pattern, by Mr. J. B. Vacher. Painted windows have been presented by Miss Wainwright and the family of the Messrs. Trollope. The galleries and high pews have been swept away; the space wasted by lobbies and passages has been thrown into the church; the west window has been opened; the tracery of all the clearstory windows, and of as many of those in the aisles as funds permitted, has been restored to its original condition; the plaster ceiling has been replaced by one of solid oak, a new reredos has been erected, and the old false apse of lath and plaster has been removed. The tiles throughout the church are the gift of Mr. C. Minton Campbell, M.P. The restoration was superintended by the late Sir Gilbert Scott, and since his death by his sons. Some interesting historical and architectural details of this church were given in a paper lately read by Mr. G. H. Birch, before the London and Middlesex Archæological Society, and reported in the *Builder* (p. 509, *ante*).

Barton.—The rector (the Rev. A. Blomfield) and churchwardens of Barton (Beds.) have issued an appeal for aid, to enable them to raise 1,200*l.* for the restoration of the parish church, dedicated to St. Nicholas, which in its oldest parts dates from the thirteenth century, and in its newest from the reign of James I., but which, the appeal states, "is in a woefully dilapidated condition, externally and internally," being patched up inside and outside in plaster, cement, paint, and colour-wash. In the words of the appeal, "There are peculiar circumstances belonging to this parish which render the fulfilling of the work a most arduous labour. The acreage of the parish is about 2,300 acres; two-thirds at least of these belong to 'The Manor,' or 'Willes's Estate.' Nearly all the farms, and much of the cottage property, belong to the 'Willes's Estate.' This 'Willes's Estate' has been for years, and is likely to be for ever and aye, in Chancery. The beneficiaries of this 'Willes's Estate' are five,—one has nobly contributed 100*l.*, three plead poverty and 'No interest,' the fifth is a lunatic. Application for an order of contribution from the lunatic's estate has been made, a year and a half ago; but up to this date with no result. So that the landed property, that involves two-thirds of the parish, nearly all the farms and numberless cottages, gives 100*l.* only towards this all-needful work." The plans of the proposed restoration have been prepared by Mr. W. O. Milne, of London, and sanctioned by the Bishop of Ely.

Hitcham.—The parish church of Hitcham has been re-opened, after restoration under the direction of Mr. G. E. Pritchett, architect, Mr. Robert Tooley, of Bury St. Edmunds, being the contractor. The church, which is dedicated to All Saints, consists of nave, north and south aisles, chancel, south porch, and tower, and belongs for the most part to the Perpendicular period, but the chancel is of an earlier date. The tower is unusually fine, and contains a peal of six bells. The nave roof, a high-pitched one of handsome proportions, adorned on the hammer-beams with emblems of the Tudor period, was repaired some time ago; but previously to the recent works the interior of the church was greatly disfigured by a gallery which blocked up the tower arch, and by the presence of old-fashioned pews, whilst the floor of the nave was raised so as to hide the bases of the columns, and so dwarf their proportions. All this is now altered. The western gallery has been removed, throwing open an elegant arch, disclosing a fine west window of three lights. The pews have also been abolished, and in taking these down the workmen discovered considerable remnants of the old oaken benching, the ends being richly and variously carved, with poppy-head terminations. These await restoration. The floor of the nave has been reduced to its proper level, and the chancel is now approached by a flight of five steps, with

two others at the altar-rails, within which the floor has been laid with Maw's encaustic tiles. The rest of the chancel is paved for the most part with fine old ledgers, which have been bereft of memorial brasses, not one of these remaining. Between the ledgers the floor is laid with plain red tiles. The nave and aisles have been re-paved with brick. The total cost has been about 1,500*l.*

Pockley.—The parish church of Pockley, near Helmsley, Yorkshire, has just been restored and enlarged, at a cost of about 1,700*l.* A small chapel of ease was built here in 1822 at the cost of Mr. Charles Slingsby Duncombe, which has now been transformed into a village church, dedicated to St. John, and stands near the site of an ancient mansion, probably the residence of the owners of Pockley before the union of this manor with that of Helmsley. The Earl of Feversham, the lord of the manor, has subscribed handsomely towards the cost of the work. The church, which is in the Norman style of architecture, has been restored under the superintendence of Mr. Scott, architect, London, and a new chancel has been added to it. There have also been added a new roof to the nave, a new porch at the southern side, a new vestry, and a new tower. A melancholy event in connexion with the work occurred last September. This was the death of the contractor for the woodwork, Mr. Smith, of Helmsley, who fell from the scaffold whilst working at the north-east corner of the chancel, being instantly killed. Since his death the work has been completed by Mr. Ellis, of Helmsley. For the present the church, which will seat about 150 persons, has to be supplied with chairs.

Maidenhead.—The church of SS. Mary and Andrew, Maidenhead, has been re-opened, after restoration and enlargement. The church was built in 1825, as a chapel-of-ease to the churches of Bray and Cookham, upon the site of an ancient chapel; it had seats for 800 persons, and half of them were free for ever; the pews, of the old, uncomfortable high style, ran round the sides, and movable seats occupied the middle. There was an organ-gallery at the west end. The building was devoid of chancel and vestry. An ecclesiastical district having been assigned to the church, the vicar, the Rev. Dr. Kearney, set to work with a view to the restoration and improvement of the building, and the result is that a new chancel, organ-chamber, tower, and vestry have been added, and other improvements effected. The tower, which is 60 ft. high, is of yellow brick, with Bath stone dressings, and contains two bells; the clock has been replaced. The chancel is paved with Minton's tiles, and the body of the church is boarded. Messrs. Bloomfield & Forster were the architects, and the contract was given to Messrs. Silver & Son, of Maidenhead, for 2,200*l.*; the rebuilding of the organ cost about 200*l.*; and other incidental charges, including the heating of the church, amounted to 300*l.*

South Bank. — This populous suburb of Middlesbrough is about to be provided with a new church, to meet the increasing requirements of the district. The designs for the new church are by Mr. C. Noel Armfield, of the firm of Messrs. Armfield & Bottomley, of Middlesbrough and Whitby, who, with five other architects, were invited by the committee to send in competitive drawings. The committee decided to take the opinion of an eminent architect, who decided that Mr. Armfield's design was the best, and it was accordingly adopted by the committee, and the building will be begun almost immediately. The church measures about 145 ft. in length and 55 ft. in width. The plan consists of nave, aisles, choir, and chancel, south transept, in which will be placed the organ, and two vestries on the north side of the choir. The chancel terminates in a semi-octagonal apse, and over the crossing of the transept and choir is reared a central tower about 30 ft. square, terminating in a saddle-back roof. The church will have fixed seats for about 750, but there will be spare room in which about 200 more might be seated in chairs. The style of architecture adopted is simple Lancet.

East Haddon.—East Haddon Church has just been reopened, after restoration, which has been carried out under the direction of Messrs. E. F. Law & Sons, architects, by Mr. Robert Young, of London. The church is partly in the Decorated style, and consists of a nave, south aisle and porch, chancel, and embattled tower surmounted by pinnacles. The south aisle and porch were rebuilt in 1839, and the tower in 1673. The whole of the church has been restored where at all dilapidated, but no alteration of the main features of the church has been made, nor has any of the detail been tampered with. The only addition is the introduction of a new organ-chamber and sacristy on the north side of the chancel. The chancel is paved with Maw & Co.'s tiles. The carving was executed by Mr. Chas. Phillips, of Northampton. The total cost of the whole of the works is about 1,400*l.* for the church, and 380*l.* for the chancel.

Hay Mills.—The new church of St. Cyprian, Hay Mills, has been consecrated by the Bishop of Worcester. The building, which has been erected from the designs of Mr. F. B. Osborn, architect, Birmingham, is in the thirteenth-century style, and consists of nave, north and south aisles, chancel, priests' vestry, porch, tower, and spire. The materials used are red brick, with stone dressings. Including a gallery at the west end, the church will accommodate between 400 and 500 persons. Several windows have been filled with stained glass by Messrs. Hardman & Co., as memorials of various members of Mr. Horsfall's family. The elaborately-carved reredos, of stone, with black marble background, is by Mr. Ruddock, of London. A large amount of decoration has been carried out in the chancel and on the chancel arch by Messrs. Hardman & Co. The entire cost of the church (some 6,000*l.*) has been defrayed by Mr. James Horsfall.

DISSENTING CHURCH-BUILDING NEWS.

London.—Tonbridge Chapel, Euston-road, one of the largest and oldest in that part of London, has just been reopened, after thorough restoration. The works have been carried out from the designs and under the immediate superintendence of Mr. Henry Hall, architect. The chapel is of the square old Congregational style, and of Classic design. The additions and alterations are in the same style, freely treated. They embrace new windows throughout, these being glazed with semi-opaque cathedral-tinted glass. The galleries have been taken down and re-erected at a more acute angle. Their fronts and seatings are all new. The old-fashioned pews in the body of the chapel have been removed, and the entire area is now reseated with open benches of modern style. The unsightly great lobby at the west end of the building has been cleared away, and smaller and more suitable ones substituted. All the woodwork throughout is of pitch pine, and varnished. An arched recess, moulded and carved, has been sunk behind the pulpit, and the walls generally and the ceiling have been painted and coloured. The gasfittings are new, and altogether the building, which, prior to the restoration, had fallen into a lamentable state of decay, now presents a very different appearance. The contractor for the whole of the works was Mr. Harry Hems, of Exeter, the foreman of works being Mr. J. T. S. Berridge. About 1,000*l.* have been expended.

Outlane. — The new chapel which is built facing the main road at the upper part of Outlane, Halifax, was opened on Thursday, June 20. It will accommodate about 500 worshippers in the body and gallery, the latter completely encircling the interior. The whole available floor-space, even to the principal part of the aisles, is fitted up with seating, the latter mostly hinged to let down when not required. The chapel is 54 ft. long, 39 ft. broad, and 29 ft. 9 in. high. The gallery is approached by three staircases, two to the front leading from the main vestibule, and one at the back from the lobby, giving access to the large vestry and basement containing the heating apparatus, &c. The total cost of the new chapel and boundary walls, including the formation of approaches, will be about 2,000*l.* Mr. T. Lister Patchett was the architect; the contractors were, for the masonry, Mr. T. Bottomley, Lindley; carpenter's and joiner's work, Messrs. Schofield & Boocock, West Vale; smith's, &c., work, Mr. T. A. Heaps, Huddersfield; painting and staining, Messrs. Earnshaw Brothers, Lindley.

Gore.—The foundation-stone of a new Congregational chapel at Gore, Radnorshire, has been laid. The building, which will be Early Gothic in style, will, when completed, seat 160 persons. The walls throughout will be built of local stone, with Grinshill stone dressings, and the roof will be covered with Welsh slates. The joiner's work, including pulpit and open seats, will be of red deal, stained and varnished. The total cost will be 1,000*l.* Mr. Fleeming, of Wolverhampton, is the architect, and Mr. Griffiths, of Walton, Old Radnor, is the builder.

Leek.—Mount Pleasant Chapel, Leek, has been re-opened, after extensive renovation and enlargement. The whole of the works have been carried out from the designs and under the superintendence of Mr. W. Sugden, architect, Leek. The builder was Mr. N. Bennett, of Burslem. Mr. Henry Stevenson, of Leek, has done the plumbing, glazing, painting, and gas-fitting; and Mr. Constantine, of Manchester, supplied the heating apparatus.

Swansea.—A new Wesleyan chapel at the Mumbles, Swansea, fronting the Bay at Oystermouth, has been opened. The building is from designs by Mr. Totton, architect, Swansea, and is built in the style of the transition from Norman to Early Gothic. At either side of the main entrance is a tower, only at present carried a little above the eaves. The interior is fitted up in pitch pine of the simplest construction, there being no display of sham carpentry. The roof is open-timbered, ceiled in between purlins and along the tie-beam, above which it is provided with means of ventilation on Professor Thomson's system. The building is heated by hot-water pipes, and lighted by ornamental wrought-iron coronas and gas-brackets, which were made by Messrs. Letheren & Co., of Cheltenham, the heating and gas-fitting being done by Mr. Bonnett, of Swansea. The aisles are laid with Messrs. Minton & Hollins's tiles. The builder was Mr. Thomas White, the total cost, including the school-building in the rear, being 2,600*l.*, exclusive of lighting, fencing, and heating. When side galleries are added the chapel will seat 600 people.——Hermon Congregational Chapel, Plasmarl, has also been opened. The memorial stone of the building was laid about a year ago. The building is Gothic in style, and has been erected by Mr. Thomas White, of Swansea, from the designs of Mr. Thomas Freeman, Brynhyfryd. The building affords sitting accommodation for about 750 persons. The front is built in range work of native blue stone, relieved with Bath-stone quoins and buttresses.

Huddersfield.—A new Baptist chapel in New North-road, Huddersfield, was lately opened. Mr. T. W. Helliwell is the architect. The style is that of Fourteenth-century Gothic. Accommodation is afforded in the nave, transepts, and galleries for 900 persons. The front elevation in New North-road rises to a height of 66 ft. to the apex of the roof. On the upper side is a tower and spire, rising to a height of 135 ft. The total cost has been upwards of 9,000*l.*

Spilsby.—A new Wesleyan chapel which has been erected on the site of the Old White Horse Inn, in the Market-place, Spilsby, has been opened. It is in the Early Gothic style, and will seat on the ground-floor and galleries upwards of 500 people. The warming will be by Grundy's hot-air system, available to both chapels and schools. There is a large school in rear of the chapel, with five class-rooms. The architect is Mr. Charles Bell, of London, and the contractors are Messrs. Hunter & Son, of Spilsby. The total cost has been about 4,800*l.*

Little Staughton.—The old Baptist meeting-house at Little Staughton, built in 1766, has been restored from plans by Mr. Wm. Jackson, architect, St. Neots; Messrs. Edey, Elgood, & Osborn being the general contractors; and Mr. Currington, the decorator.

CHURCH OF THE ORATORY, BROMPTON.

SIR,—Now that we have had an opportunity of seeing the designs submitted in competition for the new church of the Oratory at Brompton, and of judging of Mr. Waterhouse's decision, may I ask, in the interests of the profession generally, and in that of the competitors particularly, that Mr. Waterhouse's report be published in your paper in order that we may see how the other designs stand in his opinion, and the reasons he gives for premiating the ones he does.

The talent displayed in the majority of the designs, and the expense connected with the getting up of the drawings, surely entitle one to think no objections can be raised to this being done.

AN OUTSIDER.

THE "COMET" PUMP.

SIR,—Presuming on the courtesy always shown by you in all matters relating to the *Builder*, we venture to make a few remarks relative to the description of the "Comet" pump that appeared in the "Miscellanea" of your last edition, in which the action of the piston is described as "meeting the inside of the cylinder at certain points." This hardly conveys a correct idea, as the piston does not only come in contact with the cylinder at certain points, but travels evenly round the inside surface of the cylinder, throughout each revolution.

The action, though somewhat difficult to describe, is at once understood by all who have inspected the "Comet" pump we advertise to be seen at work.

BARTRUM & POWELL.

MASTERS AND MEN.

Aberdeen. — At a meeting of the operative plasterers held last week, it was resolved to accept the new bye-laws submitted by the masters, and thus the anticipated strike has been avoided.

Bristol.—The operative plasterers of Bristol, who asked in December for a rise of 1d. an hour, have notified to the masters, who wished to postpone the question, that if ½d. an hour be not granted they will cease work.

Edinburgh.—The operative plasterers of Edinburgh came out on strike on the 22nd ult., and the employers have since been endeavouring to obtain hands in Dundee and elsewhere. They offer to pay 9d. an hour and travelling expenses to Edinburgh. At a meeting of the Masters' Association last week, a letter was read from Mr. Craigie stating that he had been in communication with a few architects and builders, who had, wholly without solicitation, offered the Association, as assistance towards bringing the strike to a successful termination, a sum of 500*l.* ——At an aggregate meeting of operative joiners held last week, a report was submitted by the delegates appointed to meet the employers in conference with reference to the modification of the existing bye-laws. In this report it was stated that several alterations had been suggested by the masters on the existing regulations; and after discussion the meeting unanimously agreed to adopt these proposals. The alterations include an extension of the "walking points to the Parliamentary boundaries," and the abolition of the weekly warning, two hours and a half (the time allowed for grinding tools) being all that is to be required on either side. Another point is, that whereas, under the present system, masters are required to pay men employed outside for the same number of hours in winter as are worked by men inside the shops, it will hereafter be the rule that outside men be paid only for the number of hours which the daylight allows them to work.

Glasgow.—A meeting of the operative plasterers on strike in Glasgow, against the reduction of their wages from 10d. to 9d. per hour, was held on the 26th ult. The chairman stated that the number of employers in Glasgow who had consented to pay 10d. per hour was thirty-four, and he had no doubt their number would soon be increased.

Perth.—The wages of the Perth joiners were, on the 24th ult., reduced from 7½d. to 7d. per hour.

Runcorn.—The Runcorn joiners, who struck work on the 1st of May for a rise of wages from 33s. 6d. to 36s. per week, and a reduction of working hours to 53½ weekly, after being on strike for two months, have discovered that trade is depressed, and have entered their workshops on the old terms.

Sunderland. — A strike in the Sunderland building trade commenced on the 24th ult., about a dozen of the employers having been unable to induce their workmen to accept the reduced terms they proposed. At a meeting of the bricklayers on the previous Saturday, it was reported that fourteen masters, employing eighty men, accepted the offer of the body of the bricklayers to take 34s. per week in lieu of 36s. during the summer months, and 32s. per week in lieu of 34s. 6d. and 32s. 6d. during the winter season, and only twelve or fourteen men need come out on strike. At a meeting of the joiners, held at the same time, it was stated that 100 men would resume work at the old rate of pay, 8¾ per hour. It is estimated that upwards of 100 joiners came out on strike; forty of these are union men.

Welsh Slate Trade.—The whole of the men employed at the Pantdreiniog Slate Quarry, Bethesda, have struck work because, owing to the dulness of trade, the manager (Mr. G. Williams) declined to re-let three bargains which, it is stated by the management, have for some months been worked at a loss.——One hundred quarrymen, employed at Rhos Slate Quarries, Bettwsycoed, have struck work, owing to wages dispute. The slate trade at the present time is very dull, and a general reduction of wages throughout the slate-quarrying districts of North Wales is considered imminent.

Burslem.—The new schools which have been erected in connexion with Bethel Chapel, as a memorial of the Rev. Dr. Cooke's ministry, have been opened. The buildings have cost upwards of 1,500*l.*

Books Received.

The Engineer's Valuing Assistant: being a Practical Treatise on the Valuation of Collieries and other Mines; with New Sets of Valuation Tables. By H. D. HOSKOLD, C.E. London: Longmans. 1877.

HAVING been in past years extensively engaged in valuing coal and other mines, Mr. Hoskold found that the labour connected with the necessary and frequent calculations involving the use of rules derived from first principles became so tedious, that he determined, once for all, to prepare full and complete series of tables, to be employed in valuation as labour-savers. Not only will it be found that this useful purpose is carried out by the volume, which Messrs. Longmans have had the good sense to issue sturdily half-bound, but a very great advance in the accuracy, as well as in the speed, of many calculations will be secured by the use of the "Engineer's Valuing Assistant."

Some idea of the labour which Mr. Hoskold, by thus facing it once for all, has encountered, and thus saved to those who consult his tables, may be found from reading the mere titles of the eighteen tables which occupy more than 220 pages of closely-printed, though distinct, octavo. Table I. shows the sum to which 1*l.* will amount in *n* years up to 100 at thirty-six different rates, calculated to ten places of decimals for each percentage to nine per cent., to six places to 15 per cent., and to five places to 25 per cent. Table II. shows the sum to which 1*l.* will amount in *n* years up to 100, by half-yearly and quarterly payments, at the rate of three per cent. Table III. shows the sum to which 1*l.* will amount in *n* years up to 100, at twenty-one different rates, from ½ to 10 per cent., to ten and six places of decimals. Table IV. shows the present value of 1*l.* due *n* years hence, up to 100 years, at rates from three to ten per cent., and up to fifty years at rates from 11 to 25 per cent. Table V. serves to illustrate the redemption of capital, giving the sum necessary to be annually invested to produce 1*l.* in *n* years, at rates as before. Table VI. gives the present value, or year's purchase, of 1*l.* per annum in *n* years; allowing interest to a present purchaser upon his purchase-money at various rates. Table VII. gives the present value, as in the preceding table, supposing the creation of an annual redemption fund, at the rate of 3 per cent. per annum. Table VIII. carries further the same calculation, allowing 3¼ per cent.; and Table IX. the same at 4 per cent. per annum. Tables X. and XI. give the present value of 1*l.* per annum in *n* years, deferred for different periods,—allowing different rates of interest to the purchaser, and redeeming the investment by an annual fund. Table XII. is one of original idea, and considerable importance; giving a comparison between the old or ordinary tables of the present value of 1*l.* per annum, and a portion of the new tables in this work, which allow a purchaser interest on his purchase-money or capital invested at one rate per cent., and redeem the capital so invested another rate per cent. "Immense sums of money," Mr. Hoskold says, "are frequently spent in the purchase of mineral properties, and it is a common occurrence that much more is paid to secure them than they are really worth, and cases coming within experience are by no means few where the estimated value has exceeded the true value by 40 or 50 per cent., due in many cases to the employment of an erroneous year's purchase. Table XII. exhibits the source of such discrepancies." Tables XIII. to XVII. deal with various cases of difference in interest paid or received; and Table XVIII. gives decimal equivalents for every farthing in the pound, calculated to eight places of decimals. Mr. Hoskold certainly has not shunned sheer hard work, however much he may spare to his readers.

We have called attention first to these tables, although found in the last part of the volume, from the fact of their universal utility in all cases where it is desired to calculate anticipated, deferred, or differential values, irrespective of the nature of the property to which they relate. In Part I. Mr. Hoskold gives remarks on the valuation of mineral property, and matters connected therewith. He dwells on the necessity for firms of *bona-fide* mining engineers in large commercial centres, and urges that "an engineer should be a financier," "an engineer should be a geologist," "an engineer who reports on property should bring out every point in favour of or against it." Sound rules!—the value of which is illustrated by the yet pending proceedings as to the too-well known Emma Mine.

Part II. deals with construction of tables of values, with rules and formulæ. Part III. gives practical examples in valuing collieries, iron, and other mines, royalties, leaseholds, freeholds, life interests, &c. For all those who take interest in these matters, or who underlie any responsibility connected with them, Mr. Hoskold's book will be found an indispensable *vade mecum*. It is well and clearly printed by Messrs. Spottiswoode, and concludes with a good index. It is rare to see so thorough a piece of literary workmanship.

VARIORUM.

THE new number of the *Magazine of Art* gives some interesting comments on David Cox:—"In the year 1841 David Cox may be considered to have attained his full strength as a landscape-painter. It is certain that within a few years of this date he produced many of his finest works, both in oil and water colours. If he ever knew anything of the Higher Life in Art he knew it then; if his works are manifestations of it at all, they were full of it then. In that year he sent two of his paintings to the Society of British Artists,—'A Heath Scene' and 'A Water-mill.' There is no reason to suppose that these pictures were not well placed; though the painter himself appears to have been a little doubtful as to his mastery of the material, which was comparatively new to him; for, after seeing them in the exhibition, he wrote to a friend that they 'looked chalky for want of glazing, which could not be done, as the day appointed for touching, &c., was during my short visit to Birmingham.' Next year, however, he was again a contributor; but his works were either rejected or hung less favourably. Whether they were again sent in an unfinished state, and the committee hesitated a second time to incur the risk of their remaining so throughout the season, there is no evidence to show; but the loss to the society was irretrievable; under the urgent advice of a friend, David Cox resolved to send there no more. He then painted for the British Institution, another well-known London exhibition; but the treatment he received there appears to have been still more unfavourable. His pictures were again and again rejected. Thus he wrote, "I suppose David knows that my picture is rejected at the Institution," and again, "I am sure there must be worse there." His friend, who resented so deeply his disappointment at Suffolk-street, was equally indignant with the hanging-committee of Pall-Mall. But the advice "to send no more" was not so easy of application; it would simply have had the effect, as we shall see presently, of shutting out from every exhibition in London the paintings of one of the greatest of England's landscapists. As for the painter himself,—generous, courageous, large-hearted,—he was content to say, in the sweet humour so characteristic of him, "I begin to feel quite furious, and therefore hope to succeed much better." Nevertheless, we do not wonder when we read a little further on that he did not send much more to the British Institution."——The following, from *Great Industries of Great Britain*, should make men think,—"Industrial work of various kinds may produce in the lungs of the operative—consumption, bronchitis, asthma; in their hearts—palpitation, intermittent action, bloodlessness; in their stomachs—dyspepsia, vomiting, diarrhœa, constipation, colics; in their skin—ulceration and irruptions; in their brains and nervous systems—headache, dizziness, paralysis, neuralgia. There is no doubt whatever that by far the greater number of these maladies might be eliminated from the catalogue, if proper precautions were insisted on by the employers, and carried out by the workers. The issues at stake are, it will be seen, of serious importance. The annual death-rate in England and Wales being taken at 25 in the 1,000, that of the industrial community stands at 27 in the 1,000. The former figures represent an annual mortality of 125,000 in the 5,000,000, the latter of 135,000 in the 5,000,000; consequently, industrial disease robs us of 10,000 lives annually. When there is added to this death-roll the great physical suffering which accompanies trade diseases, the loss of wages during periods of prolonged sickness, surely our earnest attention is urgently demanded to a sanitary reformation. There are about 900 factory surgeons through-

out the kingdom, and right well are their duties discharged, in spite of miserable pay. But their powers of beneficial interference are too narrowly bounded by stringent 'regulations.' They, of course, have the privilege of sending in 'reports' to the Local Government Board; but, as a satire on State sanitation, it is from these past and present reports that the facts regarding existing preventible trade disease are gathered. The central authority has the strength of a giant; but it is, as all local governing bodies know, chained in the fetters of a stolid, immovable officialism. Were the factory surgeons intrusted with more extensive powers, a happier era might dawn on us; but, as it now stands, they are well-nigh sick of pointing out evils that are ignored, and of suggesting remedies that nobody will use."

Miscellanea.

Statistical Society.—At the meeting of this society at their rooms, King's College, Strand, there was an adjourned discussion on Mr. Newmarch's paper "On the Progress of the Foreign Trade of the United Kingdom," read at the previous meeting of the society. In that paper Mr. Newmarch showed that from 1856 to 1877 the total declared value of imports had increased from 175,000,000*l.* for 1856-9 to 380,000,000*l.* for 1875-7; while the exports for the same periods were respectively 121,000,000*l.* and 210,000,000*l.* The conclusions Mr. Newmarch drew from an examination of the data he had collected were that, tried by every statistical test, the experience and example of the United Kingdom during the last thirty years proved that the rapid extension of the foreign trade, the marked growth of incomes and profits at home, and the growth, quite as marked, of accumulated capital, had accompanied and had been in a large degree produced by steady adherence to the free-trade maxims of cultivating the imports, and leaving the exports to cultivate themselves; of regarding the benefit of the consumer as the paramount object to be attained; and of considering that the cheapness of production, and the development of the productive forces of the world, were the most powerful means for increasing the comfort and prosperity of the great body of the people of all civilised States, and of preventing wars and reducing armaments. Mr. Bourne took exception to Mr. Newmarch's arrangement of the figures in some of the tables, and said that since 1872 it would be found there was a progressive and alarming increase in the imports. According to Mr. Newmarch's theory, this was a proof of prosperity, but if in 1877 we had 89,000,000*l.* worth more food imported than in 1873, how was it that the country was not prosperous? He maintained that we must either be drawing upon previous accumulations of capital or else we were creating debts. The lesson to be learned from a review of our position was that we ought to reduce our extravagant expenditure—in the higher, the lower, and the middle classes. We must spend less; we must economise our time, instead of wasting it in holiday-making and drunkenness; we must lessen the excess of our imports and increase the amount of our exports, and seek to cultivate new markets abroad.

Artisans' Dwellings for Birmingham.—The *Birmingham Gazette* describes some designs for artisans' dwellings which have been prepared by Mr. T. J. Perry, architect. The designs (which are for buildings intended to be erected in the more populous parts of large towns) have been prepared, as we gather, merely as a suggestion for utilising some of the land which will be cleared under the Birmingham Improvement scheme. The dwellings are in flats. Each dwelling is complete in itself, and contains a large living-room, two bed-chambers, scullery, pantry, and coal-house. The rentals are calculated at from 5*s.* to 7*s.* per week, according to the size of the rooms and the story they are upon.

Clerkenwell Green.—A meeting has been held for promoting the improvement of Clerkenwell "Green," and making it a little more presentable to the eye of the passer-by. Such improvement has long been needed, and its necessity has been made more apparent by the construction of "Clerkenwell-road,"—the new thoroughfare from Old-street to New Oxford-street.

Smeed, Dean, & Co.'s Brickfields at Sittingbourne. — The *East Kent Gazette* recently gave a long and interesting description of the extensive brickfields of Messrs. Smeed, Dean, & Co. (Limited), at Sittingbourne. The brickyards are divided into three sections, viz., the Upper Field, the Central Field, and the Lower Field. Altogether they find employment for over 500 hands, and the company pay in weekly wages during the summer about 1,300*l.* They make on an average nearly sixty millions of bricks in the season; and probably during the time Mr. Smeed had the fields up to last season, a period of some thirty years, the manufacture has reached the enormous total of over 1,500 millions. Steam pugmills and all the most approved modern appliances appear to be used, and the company seems to be fully alive to its obligations to its workpeople, having erected permanent brick-built sheds for the moulders, &c. The company owns quite a little village at Snip's Hill, where many of its workpeople are housed, and where it has recently carried out a complete system of drainage.

Thrift of the Working Classes at Leicester.—A remarkable illustration of the thrift of the working classes in times of bad trade is afforded by the returns of the Leicester Savings Bank for the six months ended the 20th of May, just issued. Notwithstanding that all branches of local trade have been unusually depressed, the number of depositors and deposits show an unusually large increase. There has been an increase in the number of accounts of 1,028 since May last year, while the number of transactions since the 20th of November last was 16,305, or an increase in the half-year of 1,623. The total amount which passed through the bank during the half-year was 145,821*l.*, as against 85,674*l.* in the corresponding period last year, while the total amount of deposits invested was 302,682*l.*, as against 281,645*l.* in the corresponding period last year.

Coventry (Rural) Sewage Works. — At the last weekly meeting of the Coventry Guardians, Mr. G. Pretty in the chair, the following report of the Rural Sanitary Authority sub-committee was read by the clerk, and, on the motion of Mr. Deacon, seconded by Mr. Booth, was adopted: — "Your committee beg to report that they have visited and inspected sewage works in course of construction and completed at Stechford, Yardley, Acock's-green, and Knowle, embracing broad irrigation, precipitation, and filtration, the whole of which have been and are being carried out by Mr. Edward Pritchard, C.E. Your committee were particularly impressed with the manner in which the whole of the works were being carried out, but before recommending any one system they would ask that your clerk be instructed to invite Mr. Pritchard to come over and give his opinion as to the system best adapted to the districts under consideration."

Society of Arts. — The one hundred and twenty-fourth annual general meeting of the Society for the Encouragement of Arts, Manufactures, and Commerce, took place on the 26th ult. at the offices of the Society, Mr. W. Hawes presiding. The report submitted showed that during last session the Society had been actively engaged in a variety of subjects in connexion with the progress of arts, manufactures, and commerce. The chairman moved the adoption of the report, which was seconded by Mr. Campion. To this Mr. Ford moved an amendment that the report be first circulated amongst the members, and that its adoption be deferred. The amendment was lost, and the report was then adopted.

The Trade Unions Congress.—The next congress of the trades societies will be held in Bristol on Monday, September 9, and the five following days. The Parliamentary Committee state that "the report of the year's work will be one of great interest and importance. This, combined with the almost unprecedented position of our industries, and the exciting events of the past twelve months in labour disputes, should be of sufficient importance to make the coming congress the largest ever held."

Worcester Model Dwellings Association. The property of this Association having been disposed of, a winding-up meeting of the shareholders has been held, Mr. G. W. Hastings in the chair, when the accounts of the treasurer, showing a balance in hand of 65*l.* 5*s.* 5*d.* for division among the shareholders, was received and approved.

Tewkesbury Abbey Restoration.—At a meeting of the committee for the restoration of Tewkesbury Abbey, on the 21st ult., Sir E. A. H. Lechmere in the chair, an estimate for the restoration of the porch and the lowering of the approach from the street was produced, the amount being 247*l.* 10*s.*, and the same was accepted, subject to the architect's approval. The Freemasons of the provinces having subscribed the sum for the repair of the chapter-house, a cordial vote of thanks was passed to them. Mr. T. Gambier Parry announced that after carefully inspecting the roof, he was of opinion that, owing to the bosses being in a mutilated state, it would be better not to attempt any colouring; and he also stated that the effect of the bosses would be very good without any colouring whatever, an opinion shared by several of the committee, and it was accordingly decided to consult the architect as to whether it would be expedient to leave the bosses, &c., in their present state, and if so, what should be done with the two bays already coloured.

New Public Buildings, Rugeley.—Two foundation stones of the new public buildings at Rugeley were laid on the 26th ult., one by the Earl of Lichfield, and the other by Mr. W. B. Salisbury, chairman of the local board. The site (which is given by the Earl of Lichfield) faces the Market-square and a new street which is to be laid out from the Market-square to St. Augustine's Church. The style adopted is Geometric Gothic, and the materials employed are red bricks, with Bath stone dressings. The building principally consists of a market hall (which is to be entered from the square by a porch), 66 ft. in the extreme length, 41 ft. in width, and 40 ft. in height; a series of local board-rooms and offices, including a large room which can be used for an assembly-room, and accommodation for the petty sessional business and the police-station. There will also be accommodated the fire-engines, the volunteer armoury, the police cells, and numerous public offices. The contract is for 6,500*l.*, the contractors being Messrs. Bradney & Dawson, of Wolverhampton, and the architect, Mr. W. T. Foulkes (of the firm of Foulkes & Ryland), Birmingham.

The Canal Boats Act.—This Act came into operation on Monday last. It seeks to secure the education and protection of 70,000 "little boaters," whose home is in the cabin of a canal-boat, for which object Mr. George Smith, of Coalville, has been working since 1872. The main features of the Act are,—the separation of the sexes, and the bringing of the cabins under sanitary arrangements, so as to prevent the spread of infectious diseases and the fearful overcrowding. The regulations recently issued by the Local Government Board state that all boats, barges, and flats, must be registered, marked, and numbered, and that there must be not less than 60 cubic feet of free air space for each person above the age of twelve, and not less than 40 feet of space for each child under the age of twelve. The children will be brought under the Educational Acts by being deemed residents in the place to which the boats are registered as belonging. We did something towards the movement ourselves in earlier days.

Dulwich College Picture Gallery.—On the 25th ult. the members of the Council of the Royal Academy paid their annual visit of inspection to the picture-gallery of Dulwich College. The greater number of the pictures in this fine gallery were collected before 1807 by the celebrated picture-dealer, Noel Joseph Desenfans, for Stanislaus, king of Poland. They were originally intended for a national gallery at Warsaw, but the misfortunes of the king, which ended in the dismemberment of the Polish kingdom, prevented the completion of the design, and after the death of the king in 1798, the pictures were left in possession of the collector. Desenfans sold several of them, but also added considerably to the collection before his death, in July, 1807. He left his pictures to Sir Peter Francis Bourgeois, R.A., who, acting, it is said, on a suggestion of John Philip Kemble, left his pictures by will to Dulwich College, subject to annual inspection by the Royal Academy.

Tree-Felling at Blairgowrie.—A number of trees on the Walton Feus belonging to Dr. Rattray have been felled by steam-power. An iron band is placed round the tree a few feet from the ground, and it is drawn clean up by the root.

Lighting by Electricity.—At the meeting of the Metropolitan Board of Works on the 28th ult., Mr. Elam moved:—

"That the engineer be instructed to place himself in communication with the municipal authorities of the city of Paris, with a view of informing himself of the process and cost of the electric light as now used in the streets of that city, and that he do report such information as he may obtain to the Works and General Purposes Committee, with a view to their considering and reporting to the Board as to the advisability of making an experiment with that light upon the Thames Embankment."

He said he believed the light was commercially successful in France, but, without expressing an opinion on that subject, he was anxious that an experiment might be tried in London. Mr. Roche said it was not a question of expense for the Board. It should be the aim of the Board to light the Embankment in the most efficient manner. After some discussion, it was decided

"That it be referred to the Works and General Purposes Committee to consider the advisability of trying an experiment of electric lighting on the Thames Embankment."

An Old Scheme Recalled.—On Wednesday in last week, at the invitation of Mr. J. O. Lever, the founder of the London Steamboat Company, a party of ladies and gentlemen, including the Lord Mayor, went for a trip to and from Sheerness by the saloon steamer *Alexandra*. In proposing, at a *déjeûner* served on board, "The health of the Lord Mayor," Mr. Lever alluded to a plan, originated by himself, for reducing by nearly one-third the distance between the mouth of the Thames and London Bridge. For effecting this plan he advocated the making of a canal at a cost of 10,000,000*l.*, which could be done by levying a rate of 3d. in the pound, and the value of land, labour, and all kinds of property for thirty or forty miles around would thus be increased. He believed it would create London a free port, by which the commerce of the country could be quadrupled.

The Rollright Stones.—Mr. J. Tom Burgess, F.S.A., writes:—

"Among the ancient monuments in Mid-England, the rude stone circle known as the Rollright stones, with the dolmen and pillar-stone known respectively as the 'Whispering Knights' and the 'King Stone,' are the most interesting. With the exception, perhaps, of the 'Addlestrop Geese,' they are the sole representatives of this class of monuments in the Cotswolds and the valley of the Warwickshire Avon. On visiting them a few days ago I was grieved to find that, though far removed from railways, they were not sacred from the rude hand of the spoiler, for they now furnish another instance of the necessity for the active interference of those who wish to preserve our national monuments. Since my last visit they have been chipped and otherwise defaced. For many centuries they have been guarded by superstitious reverence; the relic-hunters have but little reverence for anything save the terrors and penalties of the law. The sooner, therefore, the Bill for the preservation of these and other similar monuments becomes law, the more likely are they to be preserved for future generations."

Mortuary for Bethnal-green. — At the last meeting of the Vestry of Bethnal-green, a report was presented by the Sanitary Committee, stating that they had considered the question of erecting a mortuary in the parish churchyard. The Chancellor of the Consistory Court had refused to allow such a building to be erected within 50 yards of any dwelling-house, and the part of the churchyard which was opposite the Vestry-hall, complied with that condition. They, therefore, recommended that spot. The surveyor had prepared plans, which had been approved by the committee and the rector, and the estimated cost of the building was 1,650*l.*, exclusive of vehicles and furniture, these latter probably costing 100*l.* more. The report was adopted.

Mansion at Old Warden.—A new mansion for Mr. Shuttleworth is in course of completion at the picturesque village of Old Warden, Beds. The building (of which a full description appears in the *Bedfordshire Mercury*) is Tudor in style, and has a clock-tower, 100 ft. high, abutting on the main block. The clock and bells were supplied by Messrs. Cook & Son, of York. The stables and coach-houses are fitted up with the appliances of Messrs. Musgrave, Belfast. The whole of the buildings have been designed by Mr. H. Clutton, architect, Messrs. Cubitt & Co. being the builders, and Mr. Wilson Bennison the clerk of works. The gardens are being rearranged under the superintendence of Mr. Edward Milner.

Mr. and Mrs. German Reed's Entertainment. — "An Artful Automaton," by Arthur Law, music by King Hall, is the title of a new second part, announced to be produced at St. George's Hall, on Wednesday next, the 10th inst. F. C. Burnand's successful piece, "Doubleday's Will," and Mr. Corney Grain's justly popular sketch, "The Paris Exhibition," will still be retained on the programme.

Struck by Lightning.—On Sunday, the 23rd ult., Kirkstall Abbey was struck by lightning, and a stone, weighing between 2 cwt. and 3 cwt., was thrown down from one of the pinnacles near the west door. Fortunately this was the full extent of the damage done to the fine old ruin.——On the same day the lightning struck the tower of the new infirmary building at Highgate, and did damage to the extent of between 200*l.* and 300*l.* The Holborn Guardians, having some doubt as to who was responsible for the damage, as the building was in the hands of the contractors, the matter was referred to the building committee for consideration and report.

Mechanical Power on Tramways.—The Select Committee appointed to inquire into the propriety of sanctioning the use of steam on tramways have advised that no impediment should be put in the way of mechanical aids, and that local authorities should be at liberty to make such agreements as they think best for their districts; but that the Board of Trade should have power to interfere to prevent either promoters from being unfairly dealt with, or the public from being defrauded in agreements. They further suggest that there should be a periodic revision of fares.

The Post-Office.—The *City Press* says "The immense growth of postal business again points to the necessity of removing the chief office from St. Martin's-le-Grand to a spot where more room can be obtained, and there is a probability of the vacant land by the Embankment at Blackfriars, belonging to the Corporation, being taken for the purpose." If this be true (although if we recollect aright the *City Press* itself contradicted the same rumour when it was in circulation some months ago) it is one more instance of the "hand-to-mouth" manner in which our public works and buildings are dealt with.

United Presbyterian Church, Perth, Competition.— Ten architects were asked to furnish plans for the new North United Presbyterian Church, Perth. Eight have complied with the request. The general conditions laid down to the architects were to furnish plans for an edifice capable of seating 1,200 persons, and the estimated cost not to exceed 7,000*l.* In all the plans which have been furnished the Greek style has been followed, and in each there is accommodation provided for the erection of an organ.

Cleopatra's Needle and the Sun-dial.—Amongst the Egyptian Antiquities in the British Museum, there is a fragment of a sun-dial, No. 778. Below this relic will be found the statement that it was discovered at the base of the obelisk called Cleopatra's Needle, and that it was presented to the Museum by J. Scott Tucker, esq., in 1852. Can any of our Egyptologists inform us, in what way this fragment was connected with the said obelisk, or can our astronomers throw any light upon it?

Prizes in Architecture, University College, London.—The following prizes have been awarded to students in Professor T. Hayter Lewis's classes, viz.:—Fine Art, Senior Class: Donaldson Silver Medal, F. D. Topham; Certificates, E. R. Hewitt and A. G. Morton. Junior Class: Prize, R. E. Smith. Construction, Senior Class: Prize, F. D. Topham; Certificate, R. H. Willis. Junior Class: Prize, W. W. K. Clarke; Certificates, W. Grellier, A. G. Morton, A. J. Gale, and J. D. Butler.

Honour for a Sheffield Art-Student.—Mr. Charles E. Wilson, one of the students of the Sheffield School of Art, has started for the Paris Exhibition, on a commission to make sketches of several of the exhibits for the English Commissioners. It is stated that the attention of Mr. Cunliffe Owen was first attracted to Mr. Wilson's work by his drawing of a panel of the Ghiberti gates, which drawing was purchased by the authorities at South Kensington.

The Electric Light for the Metropolis. At a meeting of the Chelsea Vestry on Tuesday, Mr. Fisher moved, and it was resolved to instruct Mr. G. H. Stayton, C.E., their surveyor, to report fully upon this subject, with a view to its adoption, for which purpose he is to visit Paris.

Painting on China.—H.R.H. the Princess Louise (Marchioness of Lorne) visited last week the Exhibition of Paintings on China by Lady Amateurs, at Messrs. Howell & James's Art Pottery Galleries, and has allowed her name to be added to the list of patrons of the Exhibition.

The Bath Meeting of the British Medical Association will be held from the 6th to the 9th of August. During the stay of the Association a museum will be arranged at the Assembly-rooms. The objects which will be there brought under notice will include drawings, diagrams, or models illustrating the ventilation of hospitals and private dwellings. The local hon. secretary is Mr. R. S. Fowler, of Bath.

Police-station, Moss Side, Manchester.—A new county police-station has just been opened at Moss Side. It is situated in a densely populated part of the district, at the corner of Raby-street and Heywood-street, and contains accommodation for a resident inspector, a sergeant, and five constables. The station has been erected at a cost of 1,750*l.* by Mr. George Napier, of City-road, Manchester, from the designs of Mr. Redford, architect, Manchester.

Horsemonger-lane Gaol, Newington, will, it is said, shortly be closed. The Government is stated to have offered the site to the Surrey magistrates, in satisfaction of their claims under the Prisons Act. Should the magistrates accept the offer at the ensuing quarter sessions, the prison will be pulled down, and the site used for building purposes.

Royal Academy.—On Thursday evening in last week, the president and council of the Royal Academy of Arts held their annual *soirée* at Burlington House, Piccadilly. It was numerously attended, nearly 2,000 persons being present. Two correspondents suggest that the council should throw open the exhibition, by tickets, on one Sunday afternoon.

Excursion of the Architectural Association.—It has been decided to visit some part of Yorkshire, and Mr. James Fowler, of Louth, has consented to conduct an excursion to the south-eastern portion of that county, with Hull as head-quarters. The excursion will take place in August, commencing Monday, the 12th, and ending Saturday, the 17th

Value of Property in Aldgate.—The freehold property Nos. 37 and 38, Aldgate High-street, within a few doors of the Aldgate Station of the Metropolitan Railway, covering an area of about 1,820 square feet, was sold by auction by Messrs. Fuller, Horsey, Sons, & Co. at the Mart, on Wednesday last, for the sum of 5,350*l.*, or at the rate of nearly 3*l.* per square foot.

New Corporate Offices and Town-hall, Huddersfield.—The "double event" of opening the new corporate offices and laying the foundation-stone of the new Town-hall at Huddersfield came off on the 26th ult. Mr. J. H. Abbey, the borough surveyor, was the architect in both cases.

TENDERS

The Directors of the London and North-Western Railway Company have accepted the tender of Messrs. Baker & Firbank, of Dewsbury, for widening that portion of the Liverpool and Manchester line between Barton Moss and Cross-lane stations, a length of about five miles and a half.

For the erection of factory buildings and warehouse for Messrs. H. Hodson & Co., Sugar-house lane, Stratford, E. Mr. Arthur A. West, architect:—

	Iron Shop.	Paint Shop and Warehouse.
Dove Bros.	£1,060	£1,615
Wells	1,018	1,481
Hosking Bros.	949	1,397
Morter	925	1,370
Bangs	868	1,336

For new house at the Brown Animal Sanatory Institution, Wandsworth-road, for the Senate of the University of London. Mr. J. Slater, architect:—

	House and Offices.	Fence, Walls, &c.
Snelling	£944	£80
Gill	839	64
Ashwell & Stevenson	830	75
Sheffield & Prebble (accepted)	773	64

For additions to the National Schools at Fisherton Anger, Salisbury. Mr. Fred. Bath, architect. Quantities supplied:—

Hopkins & Son	£598	10	0
Plowman	549	0	0
Sawkins	531	0	0
Tryhorn	490	0	0
Williams	465	0	0
Harris (accepted)	448	0	0

For pulling down and rebuilding No. 33, Norton Folgate, Bishopsgate, E., for Mr. Wm. Barker. M. J. H. Rowley, architect. Quantities supplied by Mr. Wm. Allport:—

Downs	£1,683	0	0
Belham & Co.	1,628	0	0
Scrivenor & Co.	1,598	0	0
Garrard	1,583	0	0
Boyce	1,539	0	0
Johnston	1,470	0	0
Smith & Son	1,464	0	0
Wagner	1,396	0	0
Johnson	1,373	0	0
Marr (accepted)	1,256	0	0

For alterations and additions to house and stables, and a gardener's cottage, at Barnet, Herts, for Mr. F. A. Bevan. Mr. John Usher, architect:—

Foster	£5,700	0	0
Twelvetrees	5,660	0	0
Ashby & Horner	5,452	0	0
Edey	5,306	0	0
F. & F. J. Wood (accepted)	5,287	0	0

For the erection of the Paddington Branch of the London Joint-Stock Bank. Messrs. Isaacs & Florence, architects. Quantities supplied by Mr. L. C. Riddett:—

Kinninmont & Son	£6,823	0	0
Hook & Oldrey	6,316	0	0
Mark	6,270	0	0
Ashby & Horner	6,150	0	0
Killby	6,064	0	0
Browne & Robinson	5,997	0	0
Patman & Fotheringham	5,975	0	0
Scrivener & Co. (accepted)	5,845	0	0

For alterations, repairs, and bar-fittings, to the Simon the Tanner, Long-lane, Bermondsey, for Mr. J. Parker. Mr. H. R. Cotton, architect:—

Andrews	£1,086	0	0
Simpson	1,045	0	0
Toms	930	0	0

Re-tendering for new schools, Silver-street, Notting-hill, for the London School Board. Mr. E. R. Robson, architect:—

Thompson	£6,535	0	0
Higgs & Hill	6,278	0	0
Brass	6,230	0	0
Tongue	6,190	0	0
Downs	6,179	0	0
Wall Bros.	6,175	0	0
Hobson	6,169	0	0
Hook & Oldrey	6,150	0	0
Grover	5,996	0	0
Stimpson & Co.	5,970	0	0

For schools, Latimer-road, Notting-hill, for the London School Board. Mr. E. R. Robson, architect:—

Wall Bros.	£9,876	0	0
Grover	9,684	0	0
Brass	9,413	0	0
Pritchard	9,374	0	0
Higgs & Hill	9,284	0	0
Nightingale	9,281	0	0
Kirk & Randell	9,183	0	0
Stimpson	9,180	0	0
Boyce	8,954	0	0
Tongue	8,905	0	0
Hobson	8,899	0	0
Hook & Oldrey	8,870	0	0

For enlargement of schools, Hollydale-road, Peckham, for the London School Board. Mr. E. R. Robson, architect:—

Brass	£3,837	0	0
Nightingale	3,770	0	0
Hook & Oldrey	3,651	0	0
Downs	3,622	0	0
Pritchard	3,544	0	0
Tyerman	3,530	0	0
Lathey Bros.	3,476	0	0
Gerrard	3,473	0	0
Kirk & Randall	3,391	0	0
Higgs & Hill	3,390	0	0

For alterations and additions to the Devonshire Arms public-house, Marloes-road, Kensington. Mr. Alfred Williams, architect:—

Hockley	£1,490	0	0
Blistrard & Son	1,398	0	0
Turrell	1,334	0	0
Hook & Oldrey	1,249	0	0
Matthews	1,237	0	0
Stimpson & Co.	1,188	0	0

For warehouse, 36 & 37, Monkwell-street, City. Messrs. Joseph & Pearson, architects:—

Scrivener & Co.	£9,993	0	0
Langmead & Way	9,949	0	0
Williams & Sons	9,949	0	0
Killby	9,700	0	0
Braid & Co.	9,645	0	0
Ryder	9,278	0	0
Brass	9,153	0	0
Bangs	9,140	0	0
Adamson & Co.	9,100	0	0
Ashby Bros.	9,062	0	0
Conder	8,996	0	0
Browne & Robinson	8,927	0	0

For Vicarage-house and Mission-rooms, St. Olaves, Mile End. Mr. Peter Dollar, architect:—

	Vicarage.	Mission-room.
Foxley	£2,445	£675
Lawrence	2,242	639
Langmead & Way	2,170	600
Browne & Robinson	2,115	617
Browse	2,064	580
Johnson	1,997	493

For Wesleyan Chapel, Stamford-street, Blackfriars. Mr. James Weir, architect. Quantities by Mr. Maylard:—

	Portland Stone.	Bath Stone.
Hoare	£6,896	£6,816
Haward Bros.	5,858	5,705
Deards	5,497	5,366
Lucas Bros.	5,493	5,245
Ansell	5,448	5,248
Hill & Higgs	5,440	5,360
Rider	5,388	5,148
Lathey Bros.	5,350	5,210

For house and offices, at Pirton Grange, Herts, for Mr. W. Hanscombe. Mr. T. C. Sorby, architect. Quantities by Mr. John Scott:—

Miskin	£7,512	0	0
Thompson	7,326	0	0
Gammon & Sons	7,150	0	0
Higgs & Hill	7,090	0	0
Lathey Bros.	6,700	0	0
Twelvetrees	6,310	0	0

For alterations at The Griffin, Charles-street, Finsbury, for Mr. Reilly:—

Staines & Son (accepted)	£172	10	0

For the erection of a warehouse, No. 92, Wood-street, City. Mr. James W. James, architect:—

Braid & Co.	£3,712	0	0

TO CORRESPONDENTS.

Mr. P.—E. F. B.—H. & O.—I. W. L.—H. J. & Co.—E. T.—F. C. M.—O. B.—J. B. E.—H. F.—L. & W.—C. O.—E. P.—J. S.—J. K. C.—N. & Co.—H. G. B.—R. & Co.—N. W.—W. H. W.—G. W. F.—J. S.—W. T.—H. R.—L. Bros.—G. H. S.—W. E. B.—J. W. M. E.—I. & F.—C. R. P.—H. G.

All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

CHARGES FOR ADVERTISEMENTS.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE, AND GENERAL ADVERTISEMENTS.

Six lines (about fifty words) or under ..... 4s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

Terms for series of Trade Advertisements, also for Special Advertisements on front page, Competitions, Contracts, Sales by Auction, &c. may be obtained on application to the Publisher.

SITUATIONS WANTED.

FOUR Lines (about THIRTY words) or under ..... 2s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

REPLIES TO ADVERTISEMENTS,

Addressed Box ——, Office of "The Builder,"

Cannot be forwarded, but *must* in all cases be *called for*, and the Office Receipt produced.

THE CHARGE FOR A BOX IS AS UNDER:—

For "Situations Wanted" Advertisements ..... 3d. per Week.
For all other Advertisements ..... 6d. per Week.

PREPAYMENT IS ABSOLUTELY NECESSARY.

*** Stamps *must not* be sent, but all small sums should be remitted by Cash in Registered Letter or by Money Order, payable at the Post-office, King-street, Covent-garden, W.C. to

DOUGLAS FOURDRINIER, Publisher,
Addressed to No. 46, Catherine-street, W.C.

Advertisements for the current week's issue must reach the office before THREE o'clock p.m. on THURSDAY.

The Publisher cannot be responsible for TESTIMONIALS left at the Office in reply to Advertisements, and strongly recommends that COPIES ONLY should be sent.

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied *direct* from the Office to residents in any part of the United Kingdom at the rate of 19s. per annum, *prepaid*. Remittances payable as above.

Bath Stone of Best Quality.
RANDELL, SAUNDERS, & CO. (Limited),
Quarrymen and Stone Merchants.
List of Prices at the Quarries and Depôts; also cost of transit to any part of the Kingdom, on application to
Bath Stone Office, Corsham, Wilts. [Advt.]

Bath Freestone in Blocks of all sizes, warranted sound, and delivered at any Port or Railway Station.—YOCKNEY & COMPANY, Sole Owners of the CORSHAM DOWN QUARRY, Corsham, Wilts, to whom all letters should be addressed. [ADVT.]

Yorkshire Stone.—Every description Sawn or Worked, ready for fixing if required. Sawn Staircases, Sawn Balconies, Sawn Landings, Sawn Steps, Sawn Coping, &c.
THOMAS WOOD & CO., Spinkwell and Cliff Wood Quarries, BRADFORD, YORKSHIRE.
London Depôt: Bridge Wharf, 283, Kingsland-road, N.E. Mr. J. J. Griffiths, Agent. [ADVT.]

Asphalte.
Seyssel, Patent Metallic Lava, and White Asphaltes.
M. STODART & CO.
Office:
No. 90, Cannon-street, E.C. [ADVT.]

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 38, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds and milk-rooms, granaries, tun-rooms, and terraces. [ADVT.]

VERITY BROTHERS.
Patent Ventilator, or Air-Propeller, for the introduction of Cold or Warm air into Dwellings, &c.
The machine may be seen in action at their Show-rooms, 127, Regent-street, London, W.
The apparatus consists of a drum with a double set of fans, which are worked by a fly-wheel placed in the centre, and on the same axle as fans. The motive for this fly-wheel is arrived at by a small jet of water being directed on to it, causing both the wheel and fans to revolve with great velocity; the air passing through the machine at a rate equal to 2,500 feet per minute, if desired, according to size of apparatus.
N.B.—The above machine may be used either as an exhauster or injector, as may be preferred, or both objects combined.
Also Patentees of the Fireclay Burners for Gas Fires and Cooking Purposes, and Patentees of the Tubular Gas Boiler for Baths and Conservatories, &c.
Designers and Manufacturers of Lamps and Candelabra.
Office and Works, 155, Queen's-road, Bayswater, W. [ADVT.]

Whitland Abbey Green Slates.—These slates are of a grey green tint, are stout, and made in all sizes. A large stock available for immediate delivery.—For further particulars, apply to MANAGER, Clynderwen, R.S.O., Carmarthenshire. [ADVT.]

J. Sessions & Sons, Docks, Gloucester, Manufacturers of ENAMELLED SLATE and MARBLE CHIMNEY-PIECES, URINALS, &c. WELSH ROOFING SLATES direct from Quarries to any Station in the Kingdom. Reduction in Price of Small Sizes. [ADVT.]

Patent Stable Fittings.
MARSHALL & HATCH.
Roofing, Gates, Wrought-iron Sashes and Doors, Constructional Iron Work of every description.
Bingfield Iron Works, York-road, King's-cross, London. [ADVT.]

Seven Hundred and Fifty Illustrations of Builders' Requirements, representing Stoves, Ranges, Locks, Hinges, Screws, &c. by F. W. REYNOLDS & CO. 73, Southwark-street, London, S.E.—Price 5s. free by post, and allowed off on purchase of first parcel. [Advt.]

MICHELMORE & REAP
Manufacturers of
CHARLES COLLINGE'S PATENT
COLLINGE'S PATENT HINGES, LEVER, SCREW, & BARREL BOLTS
and IMPROVED GATE FITTINGS of every Description.
Discount to Builders. Illustrated List two stamps.
36A, BOROUGH ROAD, LONDON, S.E.

THE "BUILDER" in AMERICA.—SUBSCRIPTION, for any Time, at PUBLICATION PRICE, can be made with B. F. STEVENS, 4, Trafalgar-square, Charing-cross, London. The Annual Subscription, including Postage, is 1*l.* 1*s.* 8*d.* or $5·67 Gold, and may be remitted direct, by Bankers' Drafts or Post-office Orders or in Greenbacks and Fractional Currency in accordance with Stevens's Table (which may be had free), or paid to the New York Agents of B. F. STEVENS, Messrs. TICE & LYNCH, No. 24½, Pine-street, New York.

Now ready, with 42 Illustrations, cr. 8vo. cloth, price 6s. post-free.
MR. BANISTER FLETCHER'S NEW TEXT BOOK,
QUANTITIES,
in Tabulated form; explanatory of the best methods adopted in the measurement of Builders' Work, &c. with Tables of the various Trades, Tables of Constants for the valuation of Labour, &c.; and a complete Index for ready reference.
"A good treatise, by a competent master of his subject."—*Building News.*
London: B. T. BATSFORD, 52, High Holborn.

Now ready, second edition, enlarged and revised. 8vo. cloth.
IMPROVED SYSTEM of BOOK-KEEPING by Single and Double Entry, specially adapted for BUILDERS and CONTRACTORS. By the gainer of the Birkbeck Prize. This system secures accuracy, and contains a check against errors. Form of Time-sheets, &c. Price 3s. post-free.
London: HENRY C. BEVIS, 97, Lambeth-road, S.E.

This day, crown 8vo. with Wood Engravings and Plates, 18s.
TRAMWAYS: their CONSTRUCTION and WORKING, with special reference to the TRAMWAYS of the United Kingdom.
By D. KINNEAR CLARK, M. Inst. C.E.
Author of "A Manual of Rules, Tables, and Data," &c.
"An exhaustive and practical work."—*Building News*, May 3, 1878.
"Indispensable for students of the subject."—*Builder*, June 29, 1878.
CROSBY LOCKWOOD & CO. 7, Stationers' Hall-court, E.C.

IMPORTANT to ARCHITECTS and STUDENTS.
ALFRED TARRANT, 50, BEDFORD-STREET, Covent-garden, having purchased the entire remainders of the two following important WORKS, recently published by the late Firm of Day & Son (Limited), is enabled to offer them at the following low prices for cash:—
Published at 4*l.* 4*s.* offered at 18*s.*
ARCHITECTURAL SKETCHES from the CONTINENT. Views and Details from France, Italy, and Germany. By WILLIAM NORMAN SHAW. 100 plates folio, half bound, gilt edges.
Published at 3*l.* 13*s.* 6*d.* offered at 12*s.*
SPECIMENS of MEDIÆVAL ARCHITECTURE, chiefly selected from examples of the twelfth and thirteenth centuries in France and Italy. By W. EDEN NESFIELD. 100 plates folio, half bound, gilt edges.
London: ALFRED TARRANT, 50, Bedford-street, Covent-garden.

JOHN WHITEHEAD & CO.'S
New Illustrated Catalogue,
1878,
With Revised List of Prices of
BRICK, TILE, and PIPE MACHINES,
With all the Recent Improvements,
CLAY-CRUSHING ROLLER MILLS,
BRICK and TILE PRESSING MACHINES
PATENT SANITARY PIPE MACHINES,
PUG-MILLS, &c., &c.,
Can be obtained, post free, by application to
JOHN WHITEHEAD & CO.,
Albert Works, Preston.